RHODESIA

REPORT OF THE SECRETARY FOR AGRICULTURE

for the period

1st October, 1971 to 30th September, 1972

Presented to Parliament of Rhodesia

1973

Price $1,05 per copy

PRINTED BY THE GOVERNMENT PRINTER, SALISBURY
1973

24 MAY 1978

Cmd. R.R. 3—1973]

G.P. & S. 62544-8—730.

REPORT OF THE

SECRETARY FOR AGRICULTURE

Report of the Secretary for Agriculture

for the year ending 30th September, 1972

World Agricultural Survey

WORLD agricultural production in 1971 shows a 3 per cent. increase over 1970. North American output rose by 8 per cent., somewhat higher than the 6 per cent. increase recorded in Western Europe. A reduced output in the Soviet Union led to a modest 1 per cent. increase in Eastern Europe. Agricultural production rose by 3 per cent. in Oceania. By comparison the output from the developing countries increased by less than 2 per cent., well down on recent years and considerably less than the 4 per cent. target for the United Nations second Development Decade. Whilst the developed countries enjoyed an 11 per cent. gain in their agricultural trade, the developing countries suffered a 1 per cent. reduction in their agricultural export earnings. Furthermore, although international commodity prices were 3 per cent. higher than the previous year, a 6 per cent. rise in the prices of manufactured goods led to the terms of trade being more than proportionately unfavourable to the exporters of primary commodities. This appears to follow the pattern of previous years whereby the developing countries' share of the world agricultural trade continues to decline together with the tendency for their exports to secure in real terms, ever-reducing realizations.

Several important international events occurred during the year which had, and will continue to exercise, considerable influence on world agricultural trade. In December the United States dollar was devalued after being allowed to float for some months. The forward commodity markets were put in disarray over this move and continuing currency uncertainties, culminating in the floating of sterling in June, had a depressing effect on world trade in general. In early 1972 successful negotiations were concluded between Britain, Eire and Denmark for their entry into the E.E.C. in 1973. Although the enlargement of this protectionist trade block causes gloom in some quarters others see hope in the possibility of Britain exercising a moderating influence on the Common Agricultural Policy.

Production prospects for 1972 are overshadowed by the much publicized Russian winter crop failure. Russian grain production in 1972 is likely to be 15 per cent. below the target and as a result large purchases of wheat and feed grains have been placed with the United States. Chinese grain purchases have added to the tight grain position and have bolstered international grain prices. Although the 1972 position is assured, it has been predicted that the buoyant world market for beef may ease a little in the not too distant future. A 3 per cent. growth in cattle herds has taken place in the United States, Canada and Eastern Europe. The Argentine herd has risen by 5 per cent. and the Australian herd has increased by 14 per cent. From these developments any expectation of a long term shortage in beef accompanied by continuing price rises needs to be tempered with caution. Whole milk production in Western Europe is likely to increase by no more than 1 per cent., while a reduction is anticipated in North America. Japanese milk production should continue to rise. The rising demand for cheese is one of the more promising features of the dairy industry. World sugar production in 1972 is set slightly below last year's output. A poor Cuban harvest together with a less than favourable European beet crop has created a very low stocks situation. In such circumstances the market is very sensitive to major crop disasters. The outlook for cotton is dominated by an estimated 27 per cent. increase in the American crop. The reduced American crops in 1970 and 1971 pushed prices to their highest level in 20 years. Cotton crop prospects in the rest of the world are promising, so that under competition from countries anxious to dispose of surpluses the level of cotton prices could decline further.

The Rhodesian Season 1971/72

An early start to the season heralded a rainy season such as the country has not enjoyed since the mid 1950s. In particular the drier areas of the south enjoyed rainfall well above seasonal means. Late rains in April brought mixed blessings for, although beneficial to the pastoral industry, it delayed the harvesting of both cotton and grain crops. The quality of the maize crop was impaired and the serious problems of harvesting the cotton crop were accentuated by the delay. Such delays proved particularly costly in those irrigated areas following a cotton/winter wheat rotation, since delays in land preparation affected the area sown to wheat. The winter wheat crop that was sown had to face frost and rust conditions with the result that the wheat crop will in all probability be down on the previous year's record crop.

In regard to controlled products a deal of information will be found in the annual reports of the statutory bodies concerned. However, brief comment in regard to both these and other products warrants mention.

Agricultural production plans were to some extent influenced by hopes of a political settlement at the beginning of the season. However an announcement to increase the tobacco target by

10 per cent. from 59 million kilograms to 66 million kilograms was probably too late to appreciably affect the area planted and any increase was to be sought through yields. The initial maize producer price of $2,60 per bag was considerably down on the final producer price paid for the previous crop. Prospects of a record crop and yields did little to dispel the concern of the maize industry. A supplementary payment of 14 cents per bag announced towards the year's end went only a short way to reassure growers. During the year a further maize bulk silo was brought into commission at Lion's Den and plans are under way for the development of further facilities for the bulk handling of grain.

In contrast to the maize situation the initial price for seed cotton of 16,55 cents per kilogram was well received and whilst the quality of the crop was unfortunately impaired by weather conditions, the quantity delivered to the ginneries was at a record high. Increased trial production of the Del Cerro variety of cotton again showed high promise for this crop and the intention is to substantially increase the production of this variety in the coming year.

For a number of years the production of both groundnuts and soya beans has been encouraged and it is pleasing to note that in regard to groundnuts, results this year point to the success of such encouragement. Results from supplementary irrigated crops were especially good and it could be that the main future for quality produced groundnuts lies in this method of production. As regards the over-all improvement in groundnut production the sterling work of the research and extension team must be acknowledged. Whilst initially it was expected that the soya bean crop this year would show a marked increase, results now point to the more positive situation that there was very little increase in production. Such an outcome is disappointing in view of the financial and other support given to this crop together with the present strong market demand for this commodity. Research into improved varieties and other aspects of the crop will continue and it is hoped that a greater interest will be shown in this crop in the future as, in addition to giving a reasonable financial return, it can be a valuable rotational crop.

Fruit production of all varieties showed an increase and indications for the coming deciduous fruit reason point to further increases. Local market demand both for fresh and processing fruit is limited as is the opportunity for exports. Current plantings of the main varieties appear now to be at a level to meet these demands and under ideal conditions possibly exceed them, so an extension of plantings should not be undertaken without a critical examination of the marketing situation.

In the beef industry, problems of slaughter capacity loomed in March with an announcement of a cut in slaughter bookings of 40 per cent. The Cold Storage Commission took immediate steps to overcome this problem and this action together with the spreading and diverting of cattle deliveries enabled the crisis to be resolved satisfactorily and the Commission was able to handle all cattle offered for slaughter by the year's end. Work commenced on the new abattoir at Marandellas and in April it was announced that a further abattoir was to be built at Sinoia, together with the construction of central cold store facilities at Gwelo.

Milk production continued its upward trend and this would appear to be the case for the coming year. Alongside this increase, sales of whole milk and milk products have continued at record levels with a beneficial effect on the producer price for milk. Provided the supply/demand relationship remains in favourable balance the industry should continue to prosper and in this regard caution, in the introduction of factors which may stifle or reduce consumer demand for the more valuable sales items, will be necessary.

With both sheep and pig production a decline was noted especially in regard to sheep. Market demand for mutton and lamb was by no means satisfied and shortages of pig products did arise during the year. In regard to sheep, producer prices are at a high level and it is hoped that an improvement in the supply situation will materialize.

Although the outbreak of Newcastle Disease seriously affected the broiler production of certain producers the local market was generally well supplied with both poultry and eggs. The disease situation had improved considerably by the year's end and production prospects for the coming year appeared good.

Preliminary estimates for 1972 for the agricultural industry as a whole indicate that the volume of agricultural output will be 17 per cent. up on the volume in 1971. The total value of output may increase by 7 per cent. but will be largely absorbed by a 6 per cent. increase in total inputs. Net farm incomes adjusted for cost of living may be up slightly.

The State of the Industry

Whilst the acreage under tobacco showed little change this year this was not the case in respect of other main crops, especially maize. For the main crops the acreage increase was of the order of 8,5 per cent. and preliminary indications for the 1972/73 season point to a possible further increase of some 10 per cent. Most of the increases are to be found in the two Mashonaland Provinces which is as expected, as it was in these

two areas where the major reduction in tobacco production occurred. Alongside these increases in crop acreages there has been a noticeable increase in the number of beef and dairy cattle held on farms in these Provinces.

This continued expansion of crops other than tobacco has not however lessened to any extent the major significance of tobacco in the farm returns of producers within the Mashonaland area or indeed other areas. In 1971, which was a record year for both grain and fibre crops production valuewise, tobacco still represented some 24 per cent. by value of total crop output. However this increasing production of other crops and livestock in an endeavour to meet the deficit in returns resulting from the enforced reduction in tobacco production has not been undertaken without raising problems.

For each and every farm there are a number of ecological conditions which cannot be varied and therefore, for success to be achieved, it becomes a necessity to farm within the limits enforced by such conditions as soil type, altitude and certain climatic factors. When limitations on crop production do not apply suitable crop production programmes to meet these conditions can be devised and undertaken within the further factor of financial resources. However, a substantial enforced reduction in the production of the most suitable and more often the most profitable crop has necessitated, for financial reasons, a move into the production of less suitable crops and in some cases livestock. The cost of such a switch has not only been expensive in the monetary sense but also to a degree in the deterioration of the land, which has occurred through these enforced farming practices and a reduction in land protection measures through lack of financial resources. It is only human nature, however, that, when faced with a reduced income, alternative means to recoup the situation are sought and often undertaken even though they may be far from ideal.

A further contributing factor which aggravates the situation is the relatively long distances which the commodities from this increased production have to be taken for sale and, in the opposite direction, the movement onto farms of the necessary farm requisites. With a crop having a high unit value, transport expenses do not form a very high percentage of the unit return and can therefore be accepted. However with crops having very much lower unit values and being bulky in nature the impact of the transport cost factor on the return per unit can be considerable and thus the margin, between costs and returns, meagre in comparison with, say, tobacco. Hence one might say the incentive to produce more and more because of the low margin exists but, in so doing, returns per unit may fall further.

Land is a national asset and indeed the very basis of the country's existence. As such it is necessary for the custodians of this asset to be placed in a position which allows of its protection and avoids its exploitation. Where however the level of return for the products derived from the soil is dependent by and large on market realizations outside the control of the local marketing organizations, an aspect expanded upon later, the ability to pass cost increases onto the buyer is indeed limited. Bearing these considerations in mind and the present necessity to undertake farming activities under conditions often far from suitable, there could well be substance in the case for building into the farming sector compensatory financial factors. It would be necessary however to direct such benefits to the efficient, and not waste limited resources on those who are shown to be incapable of meeting the challenge of farming conditions pertaining today.

In regard to efficiency it has often been stated, and rightly so, that, when allowed to operate under conditions dictated by ecological factors, the Rhodesian farmer can, by and large, produce efficiently crop and livestock products of the highest quality. This efficiency not only results from the ability of the farmer himself but additionally in the availability of first class research and extension services which can be called upon. However there is somewhat of a blot on these achievements and that is, that whilst production efficiency is attained there would appear to be a gap between what is produced and what reaches the consumption or marketing stages. The extent of the gap need not be very wide in order to represent a substantial value. For example a 1 per cent. improvement overall, which is by no means the probable extent of the gap, could have amounted, in 1971, to an additional crop output valued at some $1,25 million.

In the case of livestock the yardstick for the gap is more easily determinable through the availability of information relating to the national herd as regards cattle numbers, births, deaths and losses, etc. A high calving percentage coupled with a high weaning rate can be regarded as the hallmark of a successful cattle industry and this more so if deaths and losses are at an absolute minimum. An examination of these national statistics covering the various facets of the cattle industry infers that possibly a problem, other than that of management, exists in the industry. If this is the case then its cost to the industry is substantial. For example, an improvement in the calving and weaning rates of say 5 per cent. with the resultant animals reaching chiller grades, could increase the return to the industry by some $3 million.

In view of these situations pertaining both in the crop and livestock sectors of the industry and

especially as the improvement in the position could result in a large financial gain there would appear to be a strong case for these problems to be examined in some depth as the financial benefits which could flow from such investigations should be well in excess of their cost.

The Professional in Agriculture

The emerging pattern of protectionist policies in world agricultural trade must be plain for all to see; if not in the policies themselves, it is made painfully apparent in the international market place where the repercussions are felt directly by the primary producer who exports to these markets. With the modest financial resources at its disposal, Government does assist the industry through pricing policies and through the provision of assured outlets for the main commodities. But in commodities where the greater proportion must be exported, Government has no ability to influence the price to any appreciable degree. No one is under any obligation to buy from this country and international markets appear to be singularly unconcerned about the plight of producers who are faced with reduced prices for their products. The serious blockages in international trade that have developed in recent years act against the interests of developing countries such as Rhodesia and there appears to be small prospect of these blockages being eliminated within the foreseeable future. Indeed the creation of regional groupings and the movement toward trade preferences and commodity agreements is a flimsy showing of accord in a general development towards what is no less than economic warfare in international trade.

What is the effect of this situation on the agricultural industry? The development of the economy hinges to no small extent upon the development and expansion of the agricultural sector. This implies that any expansion in our major export commodities must face the unpleasantness of being compelled to operate at lower profit margins. Accordingly if lower profit margins are to become a feature of agricultural production it compels the industry to increase its turnover. This does not always imply that the area under cultivation has to be enlarged, rather that the intensity of production must be increased. It can be anticipated that these pressures leading towards a higher level of output will have a concomitant requirement for an increased level of capital. One cannot escape the conclusion that an ever increasing burden of responsibility will in the future be placed upon the farm manager. In the industry of tomorrow and indeed of today, the emphasis in farming must surely be placed on the farm manager, who will be a professional in his own right.

The role of the farm manager in the future must assume far greater importance than it has in the past, and if it has not already been granted it must surely be accorded the recognition and status of a profession. As a man living by, from, and on, the land he is required to operate according to the rhythm of nature with all its perverse whims, yet at the same time he must be a master of modern agricultural technology together with being a successful manager of the considerable financial resources which will have to be placed at his disposal. Furthermore the farm manager of the future may not necessarily be the owner of the property he farms, for the professional farmer of the future is less likely to possess the financial resources to invest in land in his own right. It will be increasingly necessary for the agricultural industry to recognize that land owning and farming are two distinct but complementary businesses. The expensive investment in land must be left to those wealthy enough to enjoy it, while farming must be left to be carried out by the professionals. The two will not necessarily be the same and the land owner will be compelled in these circumstances, if farming is to be undertaken efficiently, to employ a professional or lease the land to a professional farmer.

The agricultural industry of this country has seen considerable change over the last 25 years. One of the significant transformations is the change from a pioneering venture to a state associated with the sophisticated concepts of modern industry. Within this transformation we have witnessed a change from the pioneer farmer of yesteryear who wrested a living from a relatively untamed, remote wilderness to the skilled manager of today who has to be as astute in the field of finance as he is with modern agricultural technology. Though this changing role has been accepted by the agricultural industry albeit with considerable stress, its significance is perhaps not so well appreciated by our society. Despite all the technological advances in the industry it is still committed to work very closely with nature, a concept which is probably foreign to the urban economies who pay homage to concepts of growth and productivity. Nature in its inexorable manner works to a rhythm of its own, paying scant regard to the required objectives of modern industry.

Due cognisance must be taken of the fact that the agricultural industry is not complete master of its level of output. However, the farmer, no less than his counterpart in commerce and industry, is on the land to earn a livelihood. Under circumstances largely beyond his control he is forced to operate under two contradictory types of compulsion. On the one hand he is forced to apply the latest techniques for the maximization of yield in order to boost his income, yet on the other hand he is warned by the economists to hold his production within a limit, defined by supply and demand curves, in order not to endanger through surpluses the income which he seeks. With such

contradictory goals, further complicated by erratic fluctuations in primary commodity markets, small wonder it is that the agricultural industry operates in a position of weakness *vis-à-vis* the commercial and industrial sectors of the economy. With the weak position that the farmers hold in the market place, it is imperative for society through Government to step in and redress the imbalance to the best of its ability. Accordingly policies are designed to preserve the agricultural industry not only from impoverishment but to preserve a sector which is fundamental to the future growth and prosperity of our economy.

Land Subdivision

During the year 155 applications for subdivisions were received. One hundred and thirty-one were recommended upon the Subdivision Committee while 24 were still to be reported on by various departments before being considered by the Committee. One hundred applications were approved, 25 rejected and six withdrawn.

Early in 1972, it became apparent that criteria for tea and coffee unit subdivisions were necessary, and the Department of Conservation and Extension, in consultation with the Department of Research and Specialist Services, formulated criteria which were finally accepted by all interested parties.

Legislation

There has been no new legislation of great significance during the year under review. It has been a period for the new statutory organizations such as the Agricultural Finance Corporation, Agricultural Research Council and Agricultural Development Authority to consolidate and get into their stride. The newly formed Agricultural Development Authority was charged with the task of undertaking an agricultural survey of south-western Matabeleland and by the end of the year its report had been finalized and submitted to Government. At the close of the year the administration of the Natural Resources Board was scheduled to pass over to the Ministry of Lands.

Staff

The Ministry continues to be ably served by a dedicated staff and a particular word of appreciation is necessary for those whose work lies mainly in the field. At the beginning of the year the advent of graduates from the universities of Southern Africa brought considerable relief to the staff position. The turnover in certain departments, however, still causes concern.

Acknowledgements

I wish to record my appreciation for the co-operation and assistance so willingly rendered by the numerous Ministries and Statutory organizations. Once again it is necessary to pay special tribute to the Rhodesia Railways for the outstanding service they have provided the industry. Despite their problems they have responded magnificently to the challenge of moving what must surely rank as a record agricultural output.

The Economics and Markets Branch Report

for the period 1st October, 1971 to 30th September, 1972

OVER the last 10 years there has been a growing awareness of the importance of farm management. The complexity of the subject relating to the decisions which have to be made by today's farmer have in recent years been the subject of numerous symposia and seminars. Indeed it would not be to the discredit of other agricultural disciplines to suggest that matters relating to decision making, and its effect on farm profitability and income are the first considerations which a farmer now gives to his farming operations. Unfortunately this aspect to farming is an expertise which the average farmer of today can ill-afford to acquire by experience alone.

The role of the Economics and Markets Branch has changed considerably over the last few years and a substantial amount of our resources are directed into applied research of farm management which has a practical value to today's farmer. Although there is value in revealing weaknesses in individual systems with a view to strengthening the farm enterprise, the real problem is one of anticipating problems in order to ensure that weaknesses do not occur.

Besides this farm management research the Branch continues to provide information covering a wide range of subjects on specific commodities and on particular areas. It is concerned with the factors which make agricultural production possible and with the sundry complex marketing consequences that arise from such output. The Branch fulfills a minor though important educational role both at the Agricultural colleges and within the Ministry. Various members of the Branch serve on numerous standing committees and *ad hoc* committees, some of which require fairly substantial participation in the form of preparing material for reports.

Farm Management Research

The Sixth Annual Report of Farm Management Data was published in August, covering records maintained during the 1970/71 season. The report invoked considerable public comment some of which appeared to be based on certain erroneous conclusions. In view of the press coverage it is necessary to outline in broad terms the objectives of this whole exercise.

The farm management recording scheme was established in 1962 and concentrating initially on tobacco subsequently expanded to embrace many other types of farming enterprise. The scheme involves a considerable amount of work by the co-operating farmers and from the inception of the scheme the question of sample selection has indeed been secondary in relation to that of securing volunteers prepared to participate in the scheme. Comprehensive physical and financial records maintained by the co-operating farmer are processed and studied by the staff of the farm management research section.

In recompense for the work of maintaining records each co-operator receives a summarized analysis of his operations for the year broken down according to enterprise. In addition a report is provided which highlights the apparent weaknesses and strength of the farm business and where applicable recommendations for improvements are submitted. Follow-up extension work and forward planning is largely the responsibility of the Department of Conservation and Extension. The advantage to the Ministry is that a considerable body of accurate and factual data is provided on all physical and financial inputs and outputs relating to a number of farming enterprises covering numerous cropping, pastoral and horticultural activities. Although no sampling procedure is adopted, an effort is made to secure suitable coverage for all of the six provinces.

The scheme provides valuable information which assists in preparing performance criteria and standards which are used by research workers, extension workers and indeed by individuals and organizations who have either a direct or indirect financial interest in the agricultural industry. The intelligent use of the material prepared by the Farm Management Research section can and does assist in efforts designed to improve levels of farming efficiency which in their turn have an important bearing on the level of farming profitability. The reports prepared by this section serve as a useful tool in farm planning and budgeting.

It is perhaps unfortunate that the global results depicted in this survey have been used in a loose manner to generalize on the state of the agricultural industry as a whole. In view of the number of farms covered and the selection basis adopted, it is impossible to draw broad conclusions of the general state of the industry from this section's report. This in no way detracts from its value to the industry as a whole. If anything by way of conclusions on the state of the industry's fortunes is to be drawn, it is perhaps sounder to examine the Report's results relating to the five-year identical sample.

Development Economics

This section of the Branch is responsible in the main for periodic *ad hoc* surveys required by the Ministry. It does nevertheless have a responsibility

for undertaking an input/output survey which gives a measure of the financial state of the agricultural industry. This survey is based on balance sheet data prepared for Income Tax purposes and requires little work from the farmer. The relative simplicity of the exercise enables a large sample to be covered. Unfortunately *ad hoc* surveys do interfere with the effective operation of this profitability survey work. During the year under review the report for the 1967/68 and 1968/69 survey was completed and published and work is progressing on the 1969/70 and 1970/71 survey.

In February the results of a survey into the economics of irrigation was published and in May a beef cattle production survey was completed and published. This latter exercise was undertaken in conjunction with economists from the Rhodesia National Farmers' Union. During the year a start was made into examining the economics of pyrethrum production.

One economist of this section continues to concentrate on African Purchase Area agriculture and in addition undertakes survey work in the Tribal Areas for the Ministry of Internal Affairs. Two reports covering investigations on tribal area irrigation schemes were published in March and July.

Supply and Trade

Exercises and investigations into subjects relating to the supply of agricultural input items have been carried out by this particular section. Forecast assessments of commodity production and the effect on foreign exchange earnings have been undertaken together with the issues involved in transporting agricultural output. The officer in this section serves as the Ministry's representative on the Railway Priorities Committee, a function that has assumed considerable importance in recent years with the growth in the requirement for traffic for agricultural commodities. This section is also responsible for the bi-annual Economics and Markets Report.

Visits

In November Mr. G. B. Jones attended the Annual Conference of the Agricultural Economics Society of South Africa in Pretoria. In July the Chief Agricultural Economist together with an official from the Ministry of Commerce and Industry visited South Africa to study and report on the Phormium tenax industry in that country.

Publications

1. A Survey into the Economics of some farm irrigation schemes in Rhodesia over the seasons 1968/69 and 1969/70 by Cummings and Jones (February, 1972).
2. An Economic Appraisal of Tribal Irrigation Schemes in Matibi II T.T.L. by Paraiwa (March, 1972).
3. Economic Aspects of Beef Cattle Production in Rhodesia 1965–1971 (May, 1972).
4. Trends in Agricultural Profitability 1967/68 and 1968/69 seasons (July, 1972).
5. An economic appraisal of a tribal irrigation scheme in Filabusi District by Paraiwa (July, 1972).
6. The Sixth Annual Report of Farm Management Data (August, 1972).
7. Agricultural Economics and Markets Report (July to December, 1971).
8. Agricultural Economics and Markets Report (January to June, 1972).

Staff

The establishment was brought to full strength in October, 1971, and as a result the staff position was greatly improved, although the equivalent of one professional officer and one analyst was lost to military commitments. During the year the temporary professional officer post was foregone. The Branch continues to rely on temporary analytical staff by way of vacation students.

Acknowledgement

Acknowledgements are due to the numerous farmers and to farm organizations who have assisted the Branch in one way or another with the several surveys that have been carried out. The Branch acknowledges the co-operation and assistance received from many Government Ministries and departments, statutory bodies and from individuals and organizations in the private commercial and industrial sectors. In conclusion I would like to pay tribute to the loyal and devoted service rendered by members of my own staff.

W. V. LACEY,
Chief Agricultural Economist

Land Settlement Branch Report

for the period 1st October, 1971 to 30th September, 1972

WITH effect from the 1st July, 1972, the Senior Settlement Inspector and 12 Settlement Inspectors, together with their supporting African staff, were transferred to the Lands Inspectorate of the Ministry of Lands, on whom the Branch is now dependent for the necessary field services.

At the same date responsibility for the provision and maintenance of African Purchase Land infrastructure in roads, water supplies and dips, was transferred to the Ministry of Internal Affairs.

Due to reduced staff turnover, the overtaking of backlogs of work and further streamlining of procedures, the Branch recommended a reduction in its administrative establishment in April, 1972. Five posts were subsequently abolished.

Government's decision to transfer the administration of African Purchase Land leases to the Ministry of Internal Affairs was announced in June, 1972. By the end of the reporting year this had not been implemented, but meanwhile, the Branch structure was reorganized to facilitate it.

During the year 476 European and 659 African members of the public made personal inquiries at the Branch's head office.

Land Administration

Progress in the investigation and allocation of State Land reserved by the Ministry of Lands for land settlement purposes, is given in an Appendix. Subsequent to the preparation of the previous annual report, errors were traced which resulted in the beginning of year figures for African land not reconciling with the closing figures of the previous year.

In respect of European land, the requirement introduced in January, 1972, that applicants tender an annual rental for such land as is advertised, has had two striking results. Although the highest tender received is not an overriding consideration in the Board's selection of applicants, realizations have averaged six times as much as on the arbitrary basis that previously applied. Secondly, the number of applicants for land has fallen markedly.

The consolidation with adjoining farms of small portions of African Purchase land that are no longer required for the communal purposes for which they were originally reserved, has gathered momentum since this exercise started in July, 1971. It has been completed in 12 divisions and started in 11 others involving 839 farm extensions. The rate of future progress is likely to be limited by financial provisions for final survey and the capacity of private surveyors to accept instructions for rural survey from the Surveyor General. The latter is made more difficult by the financial year ending on the 30th June, in the middle of the dry season when rural survey work can most conveniently be done.

Lease Administration

The following summaries lease administration during the year:

	European	*African*	*Total*
New leases finalized	52	349	401
Leases amended to enlarge the holding	11	78	89
Renewals with option to purchase	16	769	785
Renewals without option to purchase	2	134	136
Cessions	6	11	17
Successions	—	32	32
Cancellations	2	13	15
Relinquishments	2	14	16
Sub-leases to private companies	4	—	4
Titles authorized	48	307	355

Tenant Farming Scheme

This scheme provides for lessees of private land to apply for a government-guarantee of credit advanced by the Agricultural Finance Corporation and its predecessor, the Land and Agricultural Bank. It started in 1966, was suspended in 1970, and will terminate at the conclusion of the 1972/73 season.

Only four farmers are being assisted under the scheme in its last year, as compared with 13 in 1971/72.

Deferred Purchase Scheme

This scheme provided for the acquisition by Government of farms for leasing on commercial conditions to the applicants qualifying under the Tenant Farming Scheme. The Deferred Purchase Scheme has now been discontinued.

During the year, the following were the last farms purchased:

Farm	*District*	*Hectares*	*Price*
(*a*) Mangwendi Mission Estate	Marandellas	604,398 7	$35 131,00
(*b*) Beatrice Estate	Salisbury	191,196 0	$20 122,75
(*c*) California, Portion of Eclipse Block	Salisbury	754,582 8	$39 851,75
Total for three farms		1 550,177 5	$95 105,50

Since the inception of the scheme 17 farms have been purchased for former tenant farmers at a total cost of $561 411, averaging just over $33 000 per farm.

Wengi Proving Unit

This unit was established in 1966 to test the viability of a small but intensively managed irrigation farm in the Mazoe Valley. It is proving a success, with the preliminary estimated profit for 1971/72 again being substantial.

African Purchase Land Development

The Branch disbursed $247 000 for the provision and maintenance of African Purchase Land infrastructure up to the 30th June, 1972, when responsibility for this was transferred to the Ministry of Internal Affairs.

Acknowledgements

The Branch is indebted to several departments, especially the Department of Conservation and Extension, the Department of the Surveyor General and the Lands Inspectorate, and also to several ministries, in particular the Ministry of Lands and the Ministry of Internal Affairs, for their invaluable assistance and co-operation during the year.

I am also most grateful to my staff for their loyal support and devotion to duty.

L. T. REDMAN,
Acting Under-Secretary,
Agricultural Land Settlement.

APPENDIX

State Land administered by the Branch of Agricultural Land Settlement during the year ended 30th September, 1972	European		African	
	No. of units+	Hectares (approx.)	No. of units+	Hectares (approx.)
A. LAND HELD UNDER LEASE				
Land held under lease as at 30th September, 1971	420	870 308	4 301*	520 235
Land leased during the year	49	81 771	349	42 432=
Sub-total	469	952 079	4 650	562 667
Less: (i) Cancellations and relinquishments of leases during the year	4	4 398	27	4 351
(ii) Titles issued during the year	50	135 872	588	32 325
Total land held under lease at the end of the year	415	811 809	4 035	525 991
B. LAND HELD UNDER OFFER				
Land held under offer as at 30th September, 1971	35	36 010	120	42 205
Land allocated during the year	33	69 325	308	17 254
Sub-total	68	105 335	428	59 459
Less: (i) Land leased during the year	52	83 760	349	42 432
(ii) Offers withdrawn during the year	—	—	1	113
Total land held under offer at the end of the year	16	21 575	78	16 914
C. VACANT LAND FOR SETTLEMENT				
Vacant land as at the 30th September, 1971	25	46 287	711	140 838
Land released by Ministry of Lands for settlement during the year	32	227 546	153	5 077
Cancellations and relinquishments of leases	5	4 398	27	4 351
Withdrawal of offers	—	—	1	113
Sub-total	62	278 231	892	150 379
Less: (i) Land allocated during the year	33	69 325	308	17 254
(ii) Land withdrawn from settlement	5	3 473	12	3 561
Total vacant land as at the end of the year	24	205 433	572	129 564
GRAND TOTAL FOR LAND ADMINISTERED BY THE BRANCH AS AT THE 30TH SEPTEMBER, 1972	455	1 038 817	4 685	672 469

+ Units include all pieces of land leased separately, both farms and extensions.
* Including agreements of purchase.
= Includes 78 amendments to leases increasing the area of holdings.

Note.—Commencing figures adjusted on compilation of new farm lists.

Annual Report
Central Library—Ministry of Agriculture
for the year ending 30th September, 1972

THE Central Library can once again report increased usage over the past year, in spite of being closed for six weeks due to the move from its old quarters to the Robert Fletcher Building on the Borrowdale Road.

The Microfiche/Photocopy Service has dealt with a total of 3 189 requests, 632 pamphlets have been catalogued and 111 new books accessioned, classified and catalogued, although in the latter sections there is still a considerable backlog awaiting attention as soon as the staff position makes this possible.

The Library has dealt with an average of 980 queries per month during the year and the average number of visitors for the same period has been 312. This latter is a decrease possibly occasioned by the move which is rather supported by the increase in the number of enquiries received by mail and telephone.

This year the Library has ordered and supervised the delivery of 467 journal subscriptions throughout the Ministry, and circulated a total of 437 journals which are published at weekly, monthly, quarterly or semi-annual intervals. The Library receives and records 934 Annual Reports some of which are circulated and the remainder displayed, for those wishing to consult them, before filing.

The Exchange and Complimentary Lists for the *Rhodesia Agricultural Journal* were checked and revised during the year and this has resulted in the receipt of many journals which have not been arriving for some time. Similar revision work has been started on the Exchange and Complimentary lists for the *Rhodesian Journal of Agricultural Research*, although these are more up to date and in most cases we are receiving the exchange material.

The other major task for the past year has been the preparation and transmittal of journals for binding. A total of a little over 1 000 volumes were sent to the Department of Printing and Stationery between February and June, 1972, of which the bulk have been returned, checked and shelved.

We should once again like to record our thanks to the many libraries and other institutions in this and other countries without whose help it would have been impossible to supply many of the references requested.

JEAN MAINWARING,
Librarian.

Annual Report of the Director of Research and Specialist Services

for the year ending 30th September, 1972

FOR the second consecutive season favourable climatic conditions led to above average yields, those of maize being outstanding. There was considerable development in the cattle industry, a record kill being achieved.

During the year the Directorate participated fully in the work of the Agricultural Research Council and also maintained close liaison with the Rhodesia National Farmers' Union commodity associations, from which financial support has been received on an increasing scale.

In May Dr. Saunder attended, as a Rhodesian delegate, the Remote Sensing Symposium arranged by the Council for Scientific and Industrial Research in Pretoria, at which the scope of the U.S. Earth Research Technology Satellite programme was discussed. The possibility of Rhodesia participating in this project is under consideration.

Major development during the year included the completion of African and European housing and the provision of water supplies, roads and internal fencing at Nuanetsi and the second stage development of offices and laboratories at Chipinga. Work is well advanced on the extension of laboratories for the Branch of Plant Protection.

Under legislation, regulations were revised during the year dealing with phytosanitary control, the control of seeds, and with fertilizers, farm feeds and remedies. The pesticide regulations have been brought into effect and a considerable number of pesticides have now been registered.

Outbreaks of army worm occurred in January and March and the red locust reappeared in September, after an absence of some thirty years. Great credit is due to the entomologists of the Branch of Plant Protection and to their collaborators in other Departments and Ministries, as well as in commercial concerns, all of whom spent long hours on locust control, often under trying conditions. Without this excellent co-operation the control exercise would not have proved successful. All deserve our thanks.

Dr. Oliver West retired in August after twenty-seven years' service in veld and pasture research in Rhodesia. His contribution to our understanding of the veld has been outstanding. He has been succeeded as Chief Pasture Officer by Mr. Barnes and Mr. Cleghorn has been appointed as Officer-in-Charge of the Herbarium with special responsibility for the conduct of veld and ecological studies.

During the year staff recruitment has been satisfactory. The appointment of a development engineer, formerly on the staff of one of the colleges, to the staff of the Salisbury Agricultural Research Centre has enabled considerable savings to be made in the cost of designing and constructing new equipment.

Following re-organization within the Ministry, the Department assumed full administrative responsibility for the production of the *Rhodesia Agriculture Journal* and the *Rhodesian Journal of Agricultural Research*. As a result our publication and information unit has been strengthened by the transfer of a clerical officer.

The staff of the Department are to be congratulated on a successful year's work and the following officers are commended on the award of higher degrees: M. F. Franklin (M.Sc.); D. H. Holness (Ph.D.); P. T. C. Johnson (Ph.D); B. K. Simon (M.Sc.); P. E. L. Thomas (Ph. D).

Publications by members of this Department, and visits overseas are listed in appendices to this report, where are also recorded the names of a number of important visitors to Rhodesia.

BRANCH OF ANIMAL PRODUCTION

The past year was an unusually favourable one and one which in particular brought much relief to livestock producers in Matabeleland who had been drought stricken since 1969.

This occurred at a time when cattle, resulting from the large scale diversion from tobacco growing to livestock rearing, started to reach the market in peak numbers. At the beginning of the year the Cold Storage Commission announced that it would have to cut slaughter bookings by 40 per cent. However, all stock offered was taken in and the Commission had a record kill.

The Commission believed that farmers were applying for bookings in excess of their actual requirements. To obviate this the Commission has ruled that, in future, applications for slaughter will be treated as firm bookings and the penalty for not honouring a confirmed booking has been raised from $5 to $10 per head not delivered for slaughter.

The beef industry

The latest available statistics show that over the past year the number of beef cattle on European farms increased from 2 391 434 in 1970 to

2 586 019 head at the end of 1971. Over the same period the number of African owned cattle increased from 2 623 314 to 2 786 107.

There is still much speculation as to the extent to which cattle numbers can be increased. In this connexion the slaughter statistics show that in the prescribed areas roughly 45 per cent. more females were killed during the past 12 months than in the previous year.

From this it would seem that most farms have been fully stocked and from now on cattle numbers may be expected to fluctuate around 5½ million head.

In fact, judging by the large number of immature stock slaughtered over the past year it would seem that many tobacco farms in particular have been overstocked. To maintain or improve on the existing standards of production these farmers will be well advised to reduce their breeding herds to the carrying capacities on their farms.

The degrading of well fleshed young carcasses from the Chiller Grade to FAQ on fat cover alone has been a sore point with ranchers ever since the present grading scheme was introduced in 1966.

From the 1st January, 1973, these carcasses will be graded Chiller 3B and the price has been fixed at 1c below that of Chiller 3 which will in future be known as Chiller 3A.

Beef production research

At Matopos Research Station first matings were made in the cross-over phase of the long-term genotype x environment experiment with beef cattle.

Studies continued in the weaning of beef calves at nine to ten months compared with conventional weaning at six to seven months under unsupplemented and supplemented range conditions. Despite low milk yields in winter and decreased cow mass where late weaning was practised, late weaned calves were, on average, 34,5 kg and 19,0 kg heavier among unsupplemented and supplemented groups, respectively, compared with calves of the same age weaned at six to seven months. The efficiency of supplementary feed utilization was increased through late weaning. There is no indication that conception rates are impaired where cows wean calves at nine to ten months of age.

At Henderson there have been studies of the response of cows to mineral supplements, factors which affect carcass composition, the use of urea and the efficiency of utilization of high-grain diets by fattening cattle. Certain breeds of cattle develop laminitis when fed intensively with high-grain diets and a start has been made to determine factors which predispose animals to this condition.

Various systems of beef production are being studied at Grasslands. Breeding herds, with and without winter protein supplementation, are run on veld throughout the year or on planted pastures in summer and veld in winter. Their progeny will be run on the same basic systems as their dams but will be reared to slaughter in different ways. The heifers have grown well, those on pasture gaining 130 kg live-mass and those on veld gaining 74 kg during the summer period. So far, during the dry season, all groups have lost some weight with the greatest loss from the unsupplemented pasture/veld group and least from the year round veld group. The animals will be bulled for the first time, as three-year olds, in December, 1972.

At Makoholi heifers fed bone meal as a veld supplement from weaning age show superior nursing abilities in their successive lactations. Weaning production among supplemented animals continues to be maintained at 20 per cent. above that of their controls.

In a study comparing summer supplementary feeding to conventional practices, third year results showed small differences in dam treatment. Treatment effect on reproductive rate has yet to be experienced. Calves weaned at nine months were 10 kg heavier at the same age as those calves weaned at six months.

In an experiment examining the feasibility of increasing cow productivity by first mating heifers at 15 months, animals were diagnosed 93 per cent. pregnant in the third year.

The trial to determine the effects of mineral supplementation on young beef cattle grazed on veld continues.

Since in practice much importance is attached to Nkone colour pattern in the selection of this breed, investigations are in progress at Tjolotjo to determine whether Nkone cattle can, in fact, be bred just for this colour.

In collaboration with the Department of Veterinary Research a survey of the internal parasites of six young elephant is being carried out; it is also hoped to obtain some mass for age growth figures.

The dairy industry

The year under review was very favourable to the dairy farmer, the good rainfall being responsible for excellent grain crops and grazing in virtually all areas.

Milk intake into the D.M.B. increased by 7 per cent. over the previous year, but there was a 9,6 per cent. drop in butterfat intake. The latter

trend is expected to continue as improved transport facilities and better financial returns are an incentive for farmers to change from butterfat to whole milk sales.

In spite of the increased intake, the D.M.B. have maintained the proportion sold as whole milk at approximately 40 per cent., which is an important factor in supporting producers' prices. Sales of whole milk increased by 7,5 per cent. and a feature of note was the 19 per cent. increase in the African market over the previous year.

The average producer milk price for the year including quality premium was 6,71 cents per kilogram, an increase of 0,13 cents per kilogram over the previous year. This is the highest pay-out over the past five years.

Sales of manufactured dairy products all showed increases with the exception of Lacto and butter. The decrease in Lacto sales is attributed to a price increase in June, 1971, and butter on account of shortage of supplies resulting in controlled distribution. Cheese sales improved by 9,4 per cent., a feature of note being a 21 per cent. increase in Gouda sales. Gouda cheese appears to be gaining popularity in many other countries and in South Africa approximates to 50 per cent. of cheese sales. Sterilized milk sales increased by 35 per cent. and fresh cream by 16,8 per cent. Other substantial outlets were sale of milk to Nestles (Pvt.) Ltd., for manufacture of whole milk powder, and baby foods, and manufacture of crystal candy by Crystal Candy (Pvt.) Ltd.

Quality payments for milk based on compositional and hygienic quality continued to increase and amounted to 0,34 cents per kg during the year under review. A disturbing feature was the continued high incidence of supplies failing to attain the legal minimum standard of 8,5 per cent. on solids-not-fat content. The position was most acute during the September–November period when approximately 35 per cent. of supplies failed to achieve this standard. In spite of this, however, average quality was good, being for the February–August period 3,85 per cent. fat and 8,65 per cent. solids-not-fat. These figures indicate that the larger suppliers and those supplying milk from the high fat breeds are maintaining the good quality of the national milk supply. As has been mentioned in previous reports lack of conserved winter fodder sufficient to support an adequate plane of nutrition during the late winter period is considered to be largely responsible for the low solids-not-fat analysis on many farms.

The quality of the Board's products was well maintained and this is reflected by the 28 prize awards gained at the Rand Easter Show. Retention of the Weddel Trophy for the third year in succession, winning the Silver Challenge Cup for Cheddar Cheese, and the award of a Gold Medal for milk powder were noteworthy achievements.

In so far as the Milk Recording Scheme is concerned, there was an increase in the number of completed lactations, and average yields per cow continued to increase. Average production per cow was 3 806 kg, an increase of 111 kg over the figures for the corresponding period 1970/71. The herd with the best average production records in the Official and Semi-Official schemes was Glenara Estates, with N. H. Evans and Gwebi Agricultural College being runners-up.

In the Milking Competitions, Glenara Estates were the winners of both the Milk and Butterfat sections, establishing a record of 368 kg for the average butterfat production per cow from the best 15 animals in the herd. Runners-up in both competitions were Madrisa (Pvt.) Ltd., and N. H. Evans.

An initial survey into calf mortality rates in Milk Recorded Herds was completed during the year under review, and indicates that mortality rates are high. This disturbing feature is being investigated in greater detail with the object of improving calf rearing methods and reducing losses.

A service to assist farmers with mastitis control has also been initiated in the Salisbury area. It involves the monthly examination of bulk herd milk supplies for numbers of leucocytes present. High leucocyte counts and significant increases in counts are indicative of udder infection and call for individual cow examination by field tests, and treatment of afflicted animals. This scheme was recently introduced overseas and is proving very successful.

The routine testing of milk for the presence of antibiotics and/or inhibitory substances is proceeding satisfactorily. A pilot scheme has been launched and it is anticipated that penalties will be imposed on supplies failing the test, in the near future. Effective control is essential in the interests of public health and to avoid losses in cheese and cultured milk manufacture.

Dairy research

A simple and economical system of calf rearing has been developed from research done at Henderson in the last few years and, if applied in practice, would do much to reduce the present high mortality in young dairy replacement stock in this country. Research on the nutritional requirements of calves has continued.

The sheep industry

The hot moist weather of the past season was exceptionally favourable for various sheep diseases and farmers in the high rainfall areas in particular suffered heavy losses.

The statistics show that over the past year European-owned sheep numbers dropped from

356 139 in 1970 to 327 013 in 1971 while the number of African-owned sheep increased from 431 110 to 438 250.

To bring the grading structure into line with the local production of and the demand for sheep meat, an additional lamb grade was introduced and the age restrictions on mutton were eased.

This, together with the shortage of lamb and mutton, resulted in a fierce competition between butchers for sheep, and prices soared to well above the Commission's support prices.

Sheep research

At Matopos Research Station the effect of ewe supplementation on lamb mass at weaning was examined in respect of ewes of different ages. Among unsupplemented controls two-year-old ewes weaned the lightest lambs, with weaning mass increasing with age of dam to four years, thereafter remaining fairly constant. Ewes fed protein supplements six weeks prior to lambing in mid-October and thereafter until the new season's grass growth was established showed that supplementation virtually eliminated differences in lamb mass in weaning (20 weeks) between ewes aged 2 to 6 years. The average effect of supplementation in ewes of all age groups was to increase lamb mass ± 3 kg over their controls, and this increase was greatest ($\pm 4{,}5$ kg) where two-year-old ewes were supplemented. Supplementation also increased the sex differential in lamb mass at weaning. Among supplemented groups there was no difference in lamb mass at weaning where the ewes were fed cottonseed meal (0,09 kg digestible protein/day) or a urea lick (0,14 kg digestible protein/day).

At Grasslands Research Station the sheep unit was designed to study wool and mutton production from planted pastures with minimal concentrate supplementation. This policy resulted in a very low, and highly uneconomic, level of production from the flock and was therefore revised at the beginning of the 1971/72 season. Ewes were fed differential amounts of concentrate during the four-month lactation period with the result that the survival rate of lambs from supplemented groups was greatly increased. Nevertheless, the overall loss on weaning was still high (25 per cent.) due mainly to heavy losses of lambs from maiden ewes and unsupplemented animals. Ewes were also fed maize grain on the pastures from late February until the end of May and cotton seed meal during the dry season with the result that they were in excellent condition prior to lambing in September. Although the balance sheet for the year reflected a loss of $2 077, it is thought that the improved management will pay dividends in the long run.

In an investigation of the pen-fattening of lambs, weaners, from the sheep unit, were fed high-concentrate diets containing 10 per cent. roughage for periods of up to 140 days. The animals performed very well and the margin of revenue over expenditure was highly satisfactory.

Also at Grasslands, in a study of the effects of parasitism on sheep production, three groups of lambs were artificially reared worm-free. One group was then grazed on a worm-free pasture, one was grazed on a contaminated pasture and treated regularly with effective anthelmintics and the third was grazed on a contaminated pasture and given no anthelmintic treatment. Live-mass performance and faecal nematode egg-counts were recorded weekly. At the end of summer the animals were penned and fed a high-concentrate diet (10 per cent. roughage) *ad lib.* Two lambs from the infested/untreated group died of verminosis whilst on pasture but the performance of the survivors was similar to that of the other groups. In the feeding pens, however, the lambs reared on worm-free pasture out-performed those in the other two groups.

The pig industry

Pig production dropped a further 10 per cent. during the past year following the introduction of a quota system and Government's withdrawal of minimum pig prices in 1970.

The poultry industry

Despite the spread of Newcastle disease during the year, total poultry production increased considerably. Broiler output rose some 14 per cent. and egg production by 17 per cent. Prices for both commodities achieved some stability. Egg price fluctuations were less than for several years past. Broiler prices rose by some 4c to 7c per kilo during April.

In order to promote sales, efforts have continued to determine how quality production can be further improved.

A public egg marketing group is now in process of formation.

During the year extension requests were mainly from the smaller urban centres where potential producers seek new markets, as these centres develop.

Emphasis is given to our new cyclostyled management leaflets, which are already in the process of revision.

Feed and poultry quality standards received continuous attention leading to one new and one revised Central African Standard. Other important items dealt with included revision of the health regulations governing poultry dressing, quarantine for import, pre-slaughter stunning, national productivity studies, and African and co-operative marketing.

Poultry research

Gwebi trials included phase feeding of protein; soya meal for broiler poultry and an egg quality trial. Public health work with ducks continued in the Lowveld.

VELD AND PASTURES

Research policy

The programme of veld and pasture research has been reappraised and policy carefully defined. In doing this, the interrelationships of all factors relating to research into animal production from veld and pastures were set out. Research priorities were established by considering these interrelationships in the light of the technical and economic possibilities of increasing production and/or profitability within major environmental zones in Rhodesia.

Experience has shown that to obtain unequivocal answers to the normally complex problems of animal production from veld and pastures, it is necessary to study them in sufficient scope and depth. Accordingly, the limited staff available has been allocated to what are regarded as the most important problems and will concentrate on these.

Nuanetsi Experiment Station

This station is being developed to further much needed research into land use and animal production in the southern lowveld. Satisfactory progress has been made, though unexpected delays have been experienced with respect to the provision of water for use on irrigated pastures.

The station consists of two sections of about 1 600 ha each, one on gneiss derived soil and the other on shallow basalt derived soils. At the time the land was taken over the veld on the former site near the Nuanetsi River, after many dry seasons, was severely degraded.

However, the veld has now been rested for two seasons and with the excellent rains in the past season there has been a very marked improvement. The first of the grazing experiments is due to start in December.

The veld

The country experienced one of the best rainy seasons on record. Grass growth was surprisingly good even in areas of normally dry country which have been seriously degraded by overstocking in less favourable seasons, and which have previously suffered much damage from harvester termites. Such a flush of grass leads many to believe that the veld has "recovered". However, the present position, only a few months later, is that vast areas are now again bare or almost so, especially in tribal areas. Tragic testimony to the gross misuse of land which is occurring.

Harvester termite studies

An entomologist was posted to Matopos Research Station in 1971 to study the biology and control of harvester termites.

On the red clay soils study is being made of the changes in the composition of veld, veld in good condition and that which is intermediate. This will indicate the speed of recovery in the absence of harvester termites and domestic stock.

To estimate the number of harvester termites within sample areas a new technique using pitfall traps is being used and shows distinct promise as a much needed measure of harvester termite activity.

The effectiveness of several chemicals in the control of harvesters is also being determined.

In the Short Duration Grazing Trial at Charter Estate paddocks have been rearranged and relocated following the mapping of soils and grass communities. In the S1 treatment the number of paddocks has been reduced from 21 to 15 in number. Within the area of the S2 treatment one extra paddock has been provided, raising the number of paddocks to six. There are now two control treatments of four paddocks each.

Since the change in paddock arrangement no cattle performance data have been published.

The botanical composition of fixed sample areas is determined at intervals. So far no major changes in botanical composition have been recorded.

The grazing trials at Nyamandhlovu and Matopos were continued. At Nyamandhlovu, a one-herd-four-paddock seasonal graze system is compared with a one-herd-sixteen-paddock rapid rotational grazing system. Stocking rate was increased this year from 6 ha to 5 ha per cow and calf unit. No marked differences in either cow performance or calf growth were recorded for the fourth year in succession. At Matopos the analytical grazing trial (M.110), now in its second year, showed the same interesting trends as last year. Briefly, summer weight gains were favoured by shorter grazing periods, shorter periods of absence and lower stocking rates per paddock. Differences in production per animal with different grazing procedures are much greater at high than at low stocking rates.

A series of analytical clipping and mowing trials on both red soils and sandveld was terminated. Regrowth yields were measured in the last of the present series of "in-the-field" tuft clipping studies. Three further studies using *Heteropogon contortus* tufts grown in the greenhouse were completed; these were designed to show the effects of different water regimes on growth and response to defoliation.

Botanical analyses were done in several grazing, clearing and analytical mowing trials using modified techniques. The new approach promises to show changes which have not been detected in the past. A large volume of data obtained in the recent series of analytical trials was tabulated and processed. Much needed attention was paid the long-term ecological trials with the establishment of a total protection area on sandveld, the "sable-proofing" and the initiation of a comprehensive bush survey in the sandveld burning trial.

Pasture seed

Sales of pasture seed, registered and unregistered, through the Farmers' Co-op., official agents to the Rhodesia Pasture Seed Growers' Association, for the year ending 31st March, 1971, totalled 32 832 kg: these comprised Katambora Rhodes Grass, 16 763 kg; Love Grass, 8 035 kg; Giant Rhodes Grass, 2 359 kg; *Paspalum notatum*, 1 768 kg; Sabi Panicum, 835 kg; Siratro, 328 kg; Desmodium, 69 kg; Townsville Stylo, 390 kg.

Legume introduction

In a season of very favourable rainfall, impressive yields of Stylo were recorded from nursery plots on Grasslands and from seedings into veld on both Grasslands and Henderson. Results of cutting and grazing trials have confirmed earlier observations that protecting the erect and semi-erect forms of *Stylosanthes guyanensis* during summer and then defoliating during winter leads to rapid thinning of the stand. In contrast, stands grazed throughout the year or in summer only have remained vigorous. The fine-stem form of *S. guyanensis* and the indigenous *S. fruticosa* appear less sensitive to grazing management.

The legumes showing greatest promise on silty clay loam soils at Henderson are in many cases different from the most promising ones on sandy loams at Grasslands.

Several legumes have been added to the list of recommended varieties, i.e. *Lotononis bainesii* cv. Beit, *Macroptilium atropurpureum* cv. Siratro, and *Stylosanthes humilis* (Townsville Stylo).

Increased interest in the pasture legumes was reflected in the number of farmers who visited Grasslands to discuss the subject and in the number who have sown seed of the few strains which are available.

Planted pastures

There is now close liaison between the pasture research workers at the Henderson and Grasslands Research Stations and reciprocal facilities allow those concerned to carry out experiments at both sites. The work on intensive pastures at Henderson includes the introduction and screening of pasture grasses and the fertilization, utilization and management of pastures. Experiments are in progress to determine the most efficient methods of grazing management at various levels of fertilization with nitrogen. Residual effects that pastures have on soil conditions (compaction) and on subsequent maize yields are also being investigated. It has been found that grasses differ considerably in their susceptibility to soil nematodes and that such parasitism results in greatly reduced yields. These observations are likely to have great significance in relation to the selection of pasture grasses, especially for the sandveld.

Despite the fact that very high yields of grass have been achieved, animal production from these pastures has not been correspondingly large. For example, it has been found that there is a high incidence of goitre in lambs from ewes grazing on heavily fertilized Star grass. This problem with sheep has now been solved, by iodine supplementation, but the research has shown that this deficiency is in fact induced by large amounts of prussic acid-producing compounds in the grass, rather than to very low intakes of dietary iodine. The subject of trace and other element deficiencies in grazing animals is being studied intensively and this year muscular dystrophy (selenium deficiency) in lambs was clearly identified. The extent of this disorder, and possibly other deficiencies, are not yet known and remain a subject for further investigations.

On a production trial at Grasslands Research Station Ermelo Lovegrass, Paraguay Paspalum, Muguga Star and Bushman Mine Panicum were grown for the second season under irrigation and harvested at intervals of three, six and nine weeks. The least frequent cutting resulted in the greatest dry matter yield, the intermediate treatment in the greatest crude protein yield, and frequent cutting gave herbage of the highest crude protein percentage. Ermelo Lovegrass produced the greatest yield of dry matter, while Bushman Mine Panicum and Paraguay Paspalum respectively produced most crude protein during the first and second halves of the season.

In establishment trials, best results were obtained by underplanting grasses or legumes on a maize crop as soon as possible after emergence of the crop. This was only possible with the use of a herbicide to control the dense growth of weeds which otherwise was inimical to both the maize crop and the pasture seedings. Maize yield was unaffected by underplanting pasture.

BRANCH OF CROP PRODUCTION

All stations experienced a good growing season in which yields were generally above average although the late rains increased the incidence of certain diseases and lodging in the maize crop. The unusually long season did not favour R200 which was grown on an extensive scale for the

first time. It is hoped, however, that producers will not underestimate the value of this earlier maturing hybrid in normal seasons.

By the end of the year, an investigation into ways and means of improving crop research project planning, co-ordination and control had been instituted the immediate effects of which have been the nomination of eight Research Teams but the full value will only be realized when the vacant Branch Chief post is filled.

Agronomy

In the Lowveld, agronomic work continues on the causes of poor maize yields and growth in that environment, and in particular, the silking and tasselling patterns appeared to be significant. In physiological studies at Salisbury Research Station, valuable data relating to the apportionment of dry matter in maize were collected showing the effects of crowding, temperature and stress. The pattern of soil water loss under different populations of maize showed that the lower populations were more active at depth in the soil. Yield data collected under a wide range of known rainfall regimes are being examined in an attempt to develop production models.

Attention has been given to the potash and phosphate reserves in the alkali and basalt soils in the Lowveld which appear to be causing some concern but so far no responses have been obtained.

A three-year programme of study on the spacing, population and growth regulation of maize at Henderson Research Station has been completed and written up. Also at Henderson, but at Makoholi and Grasslands as well, the tillage research programmes have continued in co-operation with other individuals and teams. The associated and interacting problems of herbicide usage, "capping" soils, wheel-track plantings, etc., are increasingly under consideration in these programmes.

The crop research activity at Makoholi Experiment Station, which in future will be part of the Crop Productivity Team's programme, continues its attack on the short unreliable season and infertile soils by concentrating on management, variety and alternative crop studies. For example, the success of water planting techniques in that environment is largely attributable to the Makoholi work.

This year was a favourable one for wheat in the Lowveld and yields were considerably above average in spite of some stem rust. Studies of planting date and nitrogen nutrition in wheat conducted over a long period were concluded by the publication of the results and the emphasis in this programme can now be shifted towards the breeding and non-nitrogen nutrition problems. At Salisbury, yield differences in wheat were related to differential growth and ear components in order to develop improved models. The degree to which closer spacing could compensate for water shortage before flowering was also examined.

On the lowveld stations an extensive series of trials was continued on the problems of rice production under sprinkler irrigation. In particular, this work was intensified at Sabi Valley Experiment Station where this crop could play an important role in the Middle Sabi Settlement scheme. The screening and testing of varieties, especially new introductions from the International Rice Research Institute in Manila, indicated the most promising types under the local environmental conditions. Exceptionally high yields were obtained under paddy conditions on the alluvium and this method of production needs further investigation. However, blast disease remains the principal problem for study and this is difficult because of the irregular and patchy nature of attack.

Cotton agronomy continued to receive much attention, particularly in relation to the boll loss problem. Since boll loss is most serious in the Lowveld, occurs regularly and can be induced there, it has been decided to concentrate the research emphasis on this problem at Chiredzi Research Station. In addition, however, work is needed at Gatooma Research Station and possibly at the University to supplement and complement this programme.

In the Lowveld, completed and published work, conducted over a number of years, on the normal agronomy of cotton, that is the spacing, planting date, nutrition and similar production problems, has been put aside so that research can be concentrated on boll loss, varietal testing and breeding and on pest control.

At Gatooma, the effect of variety and population on maturity was examined and initial studies on growth habit, plant structure, boll growth rate, etc., have been conducted with a view to a better basic understanding of the cotton plant which is required for any advances, whether in the breeding, quality or production aspects. A three-year project on nitrogen, date of planting and in low-row spacing was completed and is to be published.

At Henderson Research Station the Weed Research Team has been increased through the establishment of a post by the Grain Producers' Association and by the return to full duty of the Team Leader (Dr. P. E. L. Thomas) after his period of attachment to the University as a Research Fellow working on Shamva Grass. In addition to continuing the routine screening of new herbicides and combinations and the bio-

logical studies of common local weeds, the Team was able, as a result of its additional staff strength, to test results and procedures under different environmental conditions; for example, work has started on the wild oat problem in winter wheat in the Victoria area.

Agronomic work on groundnuts, that led to increased interest in this crop recently, has been continued in co-operation with the pathologists, mainly on the differential responses to leafspot among varieties. However, further advances in this field are most likely to come from the development work on production techniques, particularly harvest mechanization and handling.

In the Lowveld, work continues on the main problem in groundnut production, namely excessive vegetative growth, while at Salisbury, in studies on the growth and flowering of groundnuts, the effects of spacing, variety and temperature were examined. In general, flower success rate was poor resulting in an extended cropping season.

Apparatus using 14C to measure photosynthesis of crops under field conditions has been developed and this will be supported by instruments measuring temperature, water potential, radiation and stomatal resistance so that growth can be related to environmental factors.

Plant breeding

Maize

This programme, based in Salisbury, now has increased facilities on Lowveld Research Stations for work in summer and winter. The first cycle of recurrent selections was started in four Highveld populations and two Lowveld populations. Limited quantities of a short, early maturing, lodging-resistant three-way hybrid was produced for field testing in the 1972/3 season and parent seed of a medium maturing lodging-resistant three-way hybrid was bulked up for final crossing in 1972/3. These moves resulted from the adoption of new procedures which should substantially reduce the time between the release of a new hybrid and its commercial availability. It is worth noting that this advantageous procedure is only possible under a system in which the breeder can exercise enough control over the seed production aspects of the whole programme.

Sorghum

At Gatooma, the sorghum breeding programme has reached the stage where experimental hybrids will enter yield trials in 1972/73.

Work is being intensified on downy mildew resistance and some introduced material is proving valuable in this respect.

Agronomic work has suggested that the non-tillering habit in sorghums may be worth exploiting and to this end a back-crossing programme has been started to transfer this character to breeding stocks.

Yield trials of commercial hybrids were grown at six sites.

Wheat

The national programme, based in Salisbury, handled an increased amount of breeding material through the use of the modified pedigree system of selection; furthermore, selections were taken from F6 material at both Salisbury and Chiredzi.

Progress in the wheat breeding programme in the Lowveld has led to an intensification of variety testing and screening, and one Lowveld bred variety, A72, was officially released in 1972.

The International Spring Wheat Rust Nursery (in summer) and yield nursery (in winter) were both grown to the advantage of the breeding programme in terms of disease resistance, yield and maturity data on 50 varieties.

The winter testing programme consisted of two preliminary variety trials (of 49 varieties) and 13 advanced variety trials (of 25 varieties) conducted over a wide range of environmental conditions.

Cotton

Amongst introduced material for which there is no detailed information, planted out for observation and assessment at Gatooma, a number of Albacala selections showed promise of good quality and yield and will be tested in Preliminary Variety Trials in 1972/73.

A number of introduced varieties were also tested in Preliminary Variety Trials but the results suggest that none are likely to be replacements for existing commercial varieties.

All available material in the transfer programme was planted to obtain another generation and a number of new crosses were made for entry into the transfer programme.

In the Progeny Row Selection programme a number of Albar selections showed great promise. The Albar selection, S66/236, which was released as breeder seed in 1972, showed considerable improvement over previous releases.

A number of Deltapine and Del Cerro selections have reached the final stages of testing and there are possibilities of selections from both these varieties being released (as breeders' seed) in 1973.

The cotton breeding programme which has been considerably expanded during the last three years has been well served by its consultants, Mr. John Munro of Malawi and Dr. D. van Heerden of South Africa.

Soya-beans

Soya-bean breeding work expanded according to plan. New crosses were made between 38 pairs of selected parents. During summer, segregating populations from 81 different crosses were grown, over 2 000 selections were made in 26 of these which were in the F6 generation. Seed from 55 segregating populations was established at Chiredzi Research Station in May, 1972, as a winter nursery.

Over 1 800 single plant selections from 1970/71 were grown in single plots and about 270 of these were selected for critical trials next season.

Six preliminary variety trials were conducted at Salisbury providing critical performance data on 270 new lines. An intermediate variety trial of 45 promising lines from the 1970/71 preliminary trials was conducted at four sites and an advanced variety trial with 16 entries was conducted at 13 sites. In this trial 13 of the entries were tested for the first time on a national scale. This was the first group of new lines to reach this stage of development from the present breeding programme. A number of these outyielded Rhosa, the standard commercial variety, and eight will be tested again in advanced trials during 1972/73.

Groundnuts

The groundnut breeding programme was continued with further crosses being made. A special room was developed to improve crossing efficiency and studies on dormancy indicated that heating at 50°C for 14 days was the most successful method. Provided that the seed is planted by early March it should prove feasible to produce a winter generation of breeding material in the Lowveld.

Screening of introductions and selections continued on a limited scale. Preliminary trials on early and late maturing varieties were conducted at Salisbury and Advanced Trials on both maturity groups were conducted at nine sites. Screening work on Natal-type material continued at Makoholi.

Potatoes

In the potato breeding programme four variety trials were conducted, 700 seedlings raised from crosses and 13 introductions were made and 40 lines produced from 1970 seedlings were retained for further testing. Breeder seed of seven varieties was released to the Rhodesia Seed Potato Association.

Barley

The barley programme is aimed at producing a high yielding dwarf barley with good malting quality. A few selected crosses were made between a dwarf variety and taller strains with good quality. Further selections were taken from the progeny of the natural outcross SB41. Testing was limited to an advanced variety trial with 16 varieties at three sites.

Horticulture

In the sub-tropical horticulture programme at Chiredzi Research Station several different fruit and nut types produced relatively large yields for the first time, particularly the avocados, mangoes and cashews; while the grapes bore fruit for the second time. Good growth was made by pecans, macadamias and litchis.

The banana fertilizer trial has completed its second bearing cycle and early results are ready for evaluation.

Citrus nucellar seedling selections were planted out into the field from pots and, following observational work, a fertilizer trial on pineapples was established.

At Rhodes Inyanga Experiment Station hail again damaged fruit and prevented the marketing of "choice grade"; however, peach, plum and apple cultivars were assessed for the first time in terms of quality.

Trees were planted to provide experience in the handling of intensive training systems under local conditions with the further intention of comparing them critically.

Preparations for the Apple Rootstock Trial, planned for planting in 1974, included detailed topographic and fertility surveys, removal of windbreaks and the multiplication of the rootstocks.

Minor but important investigations were continued on rooting depths, moisture extraction patterns and wound sealers.

The Phormium Tenax Fertilizer Trial, planted in 1965, was terminated and was used by Tilcor as planting material.

Discussions and planning of a small deciduous fruit unit at Grasslands Research Station were continued in the hope that finance would become available soon to test certain cultivars in a more typically "watershed" environment.

At Henderson, observational type investigations continued on deciduous fruit varieties, strawberries and vegetables, while at Grasslands a small and successful programme of work on pyrethrum was conducted.

At Chipinga Experiment Station the programme of research on coffee has been consolidated by the appointment of an Extension Specialist and a Plant Pathologist to work exclusively on this crop. Furthermore, the essen-

tial physical development of this station and provision of equipment and research facilities are now taking up less time.

Fusarium continues to spread on the station (and on farms) but less dramatically and the focus of attention has now shifted to rust which appears to be a greater menace to the industry. The various field trials on the station and on farms and estates, particularly in the Vumba, continue to provide valuable information. The leaf and soil analysis survey, conducted in co-operation with Chemistry and Soil Science, continues and is starting to benefit growers.

A comprehensive programme of physiological studies on coffee has already given useful and interesting information; in due course this work will provide the fundamental information on which the maintenance and perhaps the improvement of yields and qualities can be based.

Co-operation continues with the Tea Research Foundation in Malawi and also with certain Estates in the conduct of zinc trials on tea. Chipinga's contribution to tea work will be increased from January, 1973, when the Tea Research Officer returns to duty after national service and a period of training in Malawi.

BIOMETRICS BRANCH

The year has been noteworthy for a marked improvement in professional staffing and this is reflected in a greater throughput of work than ever before. The arrangement with Air Rhodesia Corporation to use their I.C.L. 1500 Computer has continued as previously, and the time spent on this machine has increased by 25 per cent. over the two previous years. The current average working time of just less than 60 hours per month seems to be the maximum, which can be currently allocated to the Branch, although a peak time of 72 hours on 19 days was utilized in August. Since time availability is likely to be even more difficult in the future and with a view to developing more powerful routines, planning is proceeding on a biometrical system for use with an alternate computer.

The analysis of projects derived within the Department occupied about 80 per cent. of the total computer time used, with the Beef Performance Testing Scheme organized by the Department of Conservation and Extension, taking almost all the remainder. This Scheme, as now operated, is purely routine with little content of biometrical interest, and until a full research project can be established to evaluate the Scheme in detail and expand it, the continued involvement of this Branch is not necessary.

Evaluation of standard variety and agronomic experiments through the complete range of annual crops investigated by the Department has provided much of the work. It is pleasing to record that in most cases, and particularly for the major crops, a more rapid turnround of results than ever before has been achieved and the individual research worker has benefited by having the information available to plan the forthcoming season's projects. The collation of results from a wide range of trials has clearly demonstrated to research workers the range of variability they are likely to encounter. This information when applied to design, level of replication and plot size has proved valuable in obtaining greater precision and can now be more widely used to improve experimental techniques and thus obtain more meaningful results.

Coffee trial data, somewhat delayed in the past due to staff shortage, has now been completely evaluated with interesting conclusions. A major new project, the evaluation of foliar analysis results has been commenced in collaboration with the Branch of Chemistry and Soil Science. Evaluation of tea and deciduous fruit research is proceeding and time has already been spent on studying the results from trials designed to examine problems associated with the establishment of an apple orchard, and the management of peach trees. Analysis of veld and pasture trials has been only of small consequence this year.

Little work has been done during the year with livestock, but two other projects temporarily deferred due to staff shortage a year ago have been revived. Considerable effort has been devoted to the evaluation of results from pest control investigations in cotton. As a result, improved methods of assessing pest numbers and better techniques for measuring the efficacy of pesticides have been proposed. A fresh start has been made on evaluating rainfall factors likely to influence maize production. Specialized computer programming has been necessary to handle descriptive rainfall parameters but to date the pattern of model relating to crop yield is found to be relatively poorly defined and seemingly quite variable. While it may be possible to develop a model describing the climatic pattern it is not clear at present whether useful relationships with crop yield can be established.

The Branch has thus been able to make a major contribution in many fields of research within the Department during the year, and given staff ability and better computer facilities the effectiveness of this contribution will increase in future.

BRANCH OF CHEMISTRY AND SOIL SCIENCE

An increase in the number of samples of plant materials submitted for analysis by research stations has been largely responsible for a 14 per cent. increase in the total output of the analytical service of the agricultural chemistry section, the

chief function of which, as usual, has been to provide support for the research programmes of other branches.

In response to requests from plant breeders, a method for the determination of lysine in maize has been established, and this work is being extended to determination of tryptophan and methionine in maize and other ingredients of animal feeds.

In plant biochemistry assistance has been given to the Crop Production Branch in the use of radioactive carbon dioxide for measuring photosynthetic efficiency, and work has been started on a possible method for forecasting heterosis in experimental hybrids by measurement of mitochondrial respiratory activity; the latter type of work is fraught with practical difficulties and progress is inevitably slow, but if successful it could be of great assistance to plant breeders.

The annual survey of the incidence of aflatoxin in the groundnut crop, undertaken in collaboration with the Grain Marketing Board, has shown little change from the previous season, in spite of appreciably moister conditions in the pre-lifting and curing periods. Monitoring of other stored products and farm feeds has continued, and little or no contamination has been found, except in some samples of groundnut cake.

Two co-operative experiments on quality aspects of confectionery groundnut production have been carried out in the Darwendale district and at Chiredzi and Salisbury. In one the extent to which various insecticides are absorbed by the plant and their distribution within the plant were determined; in the aldrin and dieldrin treatments the levels of dieldrin found in the kernels were higher than the acceptable level. In the other experiment the relationship between the age of the plant and kernel dry-matter and quality indicated that relatively early lifting is necessary to achieve high quality, and that this need not necessarily reduce yield excessively.

Continued assistance has been given to the Plant Protection Branch in the determination of the persistence of pesticide residues in soils and on crops. Recently plans have been made in collaboration with the Department of Veterinary Services to start a systematic investigation of chlorinated hydrocarbon residues in animal fats during 1973.

The soil advisory service has not maintained its usual steady expansion, the decrease of 8 per cent. on the previous year's total of samples analysed being almost entirely due to a 62 per cent. decrease in the number of samples received from the Ministry of Internal Affairs, as a result of that Ministry's decision to adopt a more practical sampling programme. The number of samples submitted for fertilizer recommendations for cotton increased by 71 per cent., reversing the apparent trend observed last year.

A total of 3 195 samples were analysed for various research purposes (a slight increase on the previous year), which illustrates the contribution made by the soil-testing laboratory to the research programme of the Crop Production Branch.

In support of the soil advisory service fertilizer experiments have been conducted on private farms to test the response of cotton to molybdenum, groundnuts to nitrogen and lime, and maize to zinc, boron and sulphur; two long-term trials on coffee in the Vumba have also continued.

The nutritional study of coffee and apples by regular, systematic foliar analysis of selected plantations and orchards and formal trials on research stations has continued to expand, numbers of samples analysed increasing by 30 per cent. to 1 887. Preliminary evaluation of the steadily mounting data promises interesting results.

In the soil physics section research into soil crusting has continued, with emphasis on the development of techniques for evaluating the physical properties of soil crusts. Considerable progress has been made in establishing a technique for impregnating crusts with a resin containing a fluorescent dye; thin sections are then cut and photographed under a microscope. It appears that pore-size distribution in and beneath the crust can readily be assessed in this manner. In complementary collaborative field trials at Henderson Research Station, lysimeters have been installed in the cotton rotation to observe run-off under different methods of soil management.

During the year a second automatically operated rain shelter was completed which, together with the first one, enabled a simple maize-population/water-use experiment to be carried out in co-operation with the Crop Ecologist. The two shelters performed well during the season and will clearly be of great significance in research into the water requirements of summer crops.

During the year the amount of soil survey work done at the request of other departments and ministries increased materially compared with the previous two years, both in Intensive Conservation Areas and Tribal Trust Lands.

Apart from the continuation of research projects started earlier — such as the genesis of granite-derived soils, the reclamation of sodic soils, and the re-use of regeneration waters in the south-eastern lowveld—several new investigations were started, some of which were initiated as a result of problems referred to the Branch. One of these was an investigation into the occurrence of acid sulphate soils in certain vleis, a phenomenon

hitherto unknown in Rhodesia and usually associated with marine flood-plains. Another experiment, which may have considerable practical application, especially in the Sabi Valley, was an attempt to prevent the accumulation of standing water in some of the pans found in alluvial soils by means of vertical stone- and sand-filled drains instead of the conventional and more costly drainage works.

Other problems investigated were the development of high water tables on irrigation schemes and the causes of various types of pollution in vleis and water courses; the latter were undertaken at the request of the Ministry of Water Development.

In the pedology laboratory, experimental work has shown that the exchangeable aluminium status of Rhodesian soils can be accurately estimated from the soil pH, provided that the soil group to which the soil belongs (in terms of the Rhodesian classification) has been established.

A considerable number of samples were submitted to the laboratory by other organizations, mostly for determination of the sodium status of materials used for dam construction and for identification of clay minerals.

In the long-term fertility and tillage trials in which the Soil Productivity Research Laboratory is co-operating, correction of acute magnesium deficiency has reversed downward trends in maize yields and soil organic matter at two sites. Field studies have shown the existence of layers resistant to penetration 5-15 cm below the nominal plough layer and a close relationship between root proliferation and penetrometer resistance.

Methods of determining available zinc in the soil have been tested, and a good correlation was established between available zinc, the zinc content of the plant, and the occurrence of zinc deficiency symptoms. It is noteworthy, however, that out of eight sites on which signs of zinc deficiency were observed in control plots only three gave a response to applied zinc. Experiments using the new zincated fertilizer have shown that it is an effective zinc carrier.

Studies on the inter-relationship between soil pH, molybdenum and manganese are in progress, and initial trials have shown a response to molybdenum and to lime, where molybdenum deficiency occurred, but no additional benefit from applying both.

Further work has been done on forms of sulphur and methods of application on easily leached sands; and in greenhouse experiments on two soils from irrigation schemes in Lowveld Tribal Trust Lands, where crops had failed, acute sulphur deficiency was found; when this was corrected crop growth was limited by severe magnesium deficiency.

The effects of boron availability and temperature on the morphology and development of maize in its early stages of growth are being studied in the greenhouse. It has been found that low temperatures induce transient suckering, and high temperatures for a period of four weeks reduce the ultimate size of the plant, but no cob abnormalities, such as are often associated with boron deficiency, have been observed with any temperature or boron treatment.

The causes and consequences of leaf-splitting of maize are being investigated. Affected plants in farm crops have been tagged and compared with normal plants at harvest; no reduction in either cob or grain weights has been found. In two variety/population trials the degree of splitting tended to be greatest on SR52 at high fertility levels, and again there was no apparent reduction of yield.

In physiological studies of germinating maize it has been established that wide diurnal fluctuations of temperature, or short spells of cold nights, have a markedly adverse effect on emergence of maize seedlings. Under these conditions elongation of the plumule is limited and leaves unfurl below ground; consequently emergence is reduced even in moist soil with no physical impedence.

BRANCH OF PLANT PROTECTION

Plant pathology

A Plant Pathologist commenced duties at Chipinga Experiment Station on the 1st June, 1972, where a laboratory, equipped by a grant from the Rhodesia Coffee Growers' Association, is now fully operational.

Coffee rust, *Hemileia vastatrix*, was recorded after an absence of 55 years in the Melsetter–Chipinga area, and by September had affected 16 farms, in some cases causing severe defoliation. Surveys of the incidence of rust and Fusarium bark disease (*F. stilboides*) were undertaken, and spray trials for rust control were commenced.

Studies on the fungal deterioration of stored maize were terminated. It has been shown that the level of fungal contamination of stored maize in Rhodesia is generally low. The most common disorder of stack-stored maize is "stackburn", which results from localized high temperatures within stacks.

Seed dressing trials for the control of *Rhizoctonia solani* on cotton continued. Several genera within the Tulasnellaceae are involved in damping-off of cotton. *Thanatephorus cucun ris* (*R. solani*) is the most frequent, but *Ceratobasidium* and other species are not uncommon.

Leptosphaerulina trifolii, associated with a widespread blotching of groundnut foliage, was

most severe this last season causing some defoliation towards the end of crop development. Little control of the leaf blotch was achieved in fungicide trials. Yield responses of the late maturing groundnut cultivar Makulu Red to intensive fungicide spray programmes following early planting under irrigation, were low, and it appears that early planting enables crops partially to escape the effects of defoliation due to *Cercospora arachidicola*.

The incidence of Verticillium wilt of cotton in the Mazoe Valley increased. Although most outbreaks are still limited in extent some crops have been severely affected.

Nematology

Work on the nematode *Pratylenchus brachyurus* has indicated its potential importance in the cotton, groundnut and maize crops.

A non-replicated soil fumigation trial on maize grown in soil infested with *P. brachyurus* indicated that maize yields could be lowered by 25 per cent. by the nematode. At the same time soil fumigation trials to test the effect of *P. brachyurus* on the yield of groundnuts grown in sandveld were carried out. Preliminary results indicate that yields may also be lowered by 25 per cent. or more due to nematode infection. These results are to be further investigated in the coming season.

The cotton soil fumigation experimental area at the Gatooma Research Station was planted to maize during the 1971/72 summer season. A further crop of maize will be planted on the area before returning to cotton.

When soil, infested with the nematode *Tylenchulus semi-penetrans*, was treated with DBCP yields of Seville Oranges were increased by 13 per cent. Despite additional soil treatments, this increase was not maintained in the two succeeding seasons.

Aphelenchoides bessevi, the causative organism of the white tip disease of rice, has been found infesting the leaves and stems of all varieties grown at the Chiredzi Research Station, but so far has not been recovered from the seed of infested plants.

Host trials on the burrowing nematode *Radopholus similis* have continued. Peach, apple, grapevine and rose do not appear to be hosts.

Thermotherapy work continued with studies on the hot water treatment of rice seed, apple, peach and plum rootstocks and potato tubers for the control of nematodes.

Seed Services

The total number of samples received for test by the Government Seed Testing Laboratory again increased (11 per cent.) over the previous year, making a cumulative total increase of 43 per cent. over the last three years. Investigations continued with tobacco seed viability indicated that bank stocks should not be kept for more than five years. A preliminary survey was carried out on commercial flower seed quality.

Dr. Schoorel, the President of the International Seed Testing Association, visited the laboratory during his short stay in the country in February.

The total area of different seed crops inspected by Government inspectors was 4 785 hectares, an increase of 18 per cent., giving a cumulative total increase of 42 per cent. over the last three years.

The Seeds Regulations, 1971, and the Seeds (Certification Scheme) Notice, 1971, were implemented, and eight certifying agencies were recognized in terms of the latter. Due to a legal technicality relating to the changeover from the old voluntary scheme to the new statutory scheme, it was necessary to introduce an appropriate amendment to the regulations. Seed Associations have also been advised that it is intended in the coming year to revise the definition of Foundation Seed, requiring production within Rhodesia.

Pesticide registration

Registration of pesticides continued during 1971/72 with a fair amount of time being devoted to the checking of label proofs.

A total of 397 pesticides were checked, approved and registered throughout the year. This included the following formulations: 250 insecticides, 54 herbicides, 65 fungicides, 9 nematicides, 2 rodenticides, 8 growth regulators, 2 defoliants, 5 molluscides, 1 avicide and 1 repellent.

In addition, 100 experimental pesticides were dealt with.

A "notice of intent" defining long term policy with regard to the use of chlorinated hydrocarbons has been distributed to commercial, farming and scientific organizations and has been found generally acceptable.

Entomology

The year was highlighted by the invasion of two plague pests, armyworm, *Spodoptera exempta* in January and March, and red locust, *Nomadacris septemfasciata* in September. These two outbreaks, although small in themselves, clearly indicated operational difficulties that could occur if a large invasion of either species developed on a country-wide scale.

The biology of cutworm species continues to be studied. Continuation of previous years' work shows that flight duration characteristics are inherited but flight duration characteristics for the total population appears to be normally distributed and not bimodal, as originally thought.

Four insecticides have been shown to be successful in controlling the range of insects that attack stored grain in native storage bins. Laboratory results have been confirmed by two large field trials at Madzima and Domboshawa.

Twenty-four insecticides are being screened against tobacco beetle as possible replacements for DDT as a residual spray in tobacco storage premises. It is expected that insecticides will be available in the 1973 season to replace DDT.

The harvester termite research is mainly concentrated on the trial area on Springs Farm, Matabeleland. A detailed botanical survey has defined the degraded and sound veld, and changes in the flora in the absence of cattle can be monitored.

Much work has gone into the preparation of a check-list of Rhodesian termites with maps of their distribution.

Ten insects that could be used in biological control programmes were reared throughout the year. Two were released at Hippo Valley Estates for red scale control and a number of additional tuber moth parasites and diamond back moth parasites were released in the Salisbury area.

Insecticides tested against potato aphids all gave over 90 per cent. kill but were unable to control the vector of leaf roll, *Mygzus persicae*, on the senescing lower leaves.

A comprehensive analysis of the residues of aldrin, dieldrin and DDT in groundnuts, when applied for the control of leaf eating and soil dwelling insect pests, was undertaken. These results show that aldrin and dieldrin accumulate in the nut, pod and roots of the groundnut.

Detailed monitoring over the year of the arthropod fauna in grassland and grassland treated with aldrin revealed marked changes in the population of some arthropods and relative stability in others.

An important event was the establishment of an insect light-trap grid over the whole of Southern Africa.

Cotton pest research

Recommendations can now be made for the commercial use of a relatively wide selection of acaricides taken from four distinct groups of chemicals between which cross-resistance has not so far been reported. Initial recommendations have been made aimed at an alternation in the use of chemically related acaricides incorporating a six-year cycle of three types of acaricides each used for two consecutive seasons.

Field testing of new pesticides during the year produced one promising acaricide, one insecticide of potential value in Heliothis bollworm control and a new selective aphicide. The value of using molasses with carbaryl and endosulfan against Heliothis bollworm and in aerial spraying was confirmed and recommendations are being published.

Trials and investigations into methods of application included reduced dosage level applied with tailbooms, and as ULV formulations applied by a modified air carrier sprayer using spinning disc battery operated atomisers. Under the trial conditions no significant differences were displayed in pest control effectiveness between conventional water based sprays and ULV sprays.

Pink bollworm surveys confirmed earlier findings concerning the breeding of pink bollworm in wild cotton and widespread infestations were found in cultivated cotton in the Espungabera/Buzi area of Moçambique. Eradication measures against the wild host plants *Gossypium hirsutum* and *Hibiscus dongolensis* in the restricted area of the Middle Sabi focus reduced pink bollworm incidence. However, some limited escapes and regrowth together with seed germination made it necessary to reclear and it is apparent that elimination of host plants from pink bollworm foci can only be made fully effective by clearing over a number of seasons.

Well over 200 laboratory screening tests were carried out during the year. These included tests of activity of a wide range of chemicals and some biological insecticides against key cotton pests including red and Heliothis bollworm, red spider mite, cotton leaf worm and cotton stainers.

Simulated early leaf damage trials indicated that young cotton plants will tolerate losses of up to half their leaf area without subsequent loss of yield or delay in date of maturity.

Scouting trials were conducted on the Gatooma Research Station into spider mite dispersal and recording methods and into bollworm egg distribution and the variability of scouting practice.

THE BACTERIOLOGICAL LABORATORY AND LEGUME INOCULANT FACTORY, GRASSLANDS

Routine culture transfers have been made at the laboratory and the inoculant factory has been supplied with all the cultures needed for inoculant production. No research has been carried out.

At the factory, inoculant production proceeded satisfactorily during the year. Sales, however, were considerably below those of 1970/71 because of a shortage of soyabean seed. The factory was enlarged during the year and working conditions have thus been greatly improved.

NATIONAL HERBARIUM AND BOTANIC GARDEN

The extension of the herbarium building was completed in May, 1972, providing a very necessary increase in storage and working space, and adequate offices for staff.

Accessions to the herbarium totalled over 7 200 sheets for the year. The number of specimens from Rhodesia remained the same, whereas the numbers received from Moçambique and Angola rose sharply. The number of accessions is only a small percentage of the specimens determined for Government departments, farmers, schools, etc., but as knowledge increases the need to retain material lessens and a high proportion of specimens is discarded to preserve storage space. Twelve thousand duplicate specimens were distributed to over 40 herbaria in different parts of the world.

Co-operation with Portugal and Britain continues in connexion with the production of the Flora Zambesiaca. The first volume of the Gramineae is published and work is being done in Salisbury on parts of the Gramineae, Compositae and Rubiaceae.

Priority has been given to completing a number of works of local interest:—

(i) A list of Rhodesian legumes by R. B. Drummond was published early in 1972. (ii) The revision of H. Wild's "A Southern Rhodesian Botanical Dictionary of Native and English Plant Names", by H. M. Biegel and S. Mavi, is expected to be on sale before the end of 1972. (iii) Bundu Book 1, Trees, Flowers and Grasses, has been completely revised and will be on sale in October, 1972. (iv) A list of Rhodesian trees, climbers and shrubs above two metres has been completed and work is proceeding on a complete list of Rhodesian plants.

Co-operation with the Department of Veterinary Services, the Medical School and the Chemistry Department of the University of Rhodesia, continued in research into medicinal and poisonous plants.

Several collecting expeditions were undertaken within Rhodesia. Two collecting expeditions were made to northern Botswana and one reached the Morrumbala and Inhaminga forests in Moçambique.

National Botanic Garden

Significant progress has been made in the botanic garden. New areas have been made park-like by the removal of rocks, levelling the ground and planting lawn. This extends the area of lawn to approximately 12 ha. A further 1 000 trees and shrubs were planted in the various sections; amongst these were a number of rare species.

The Curator visited Kirstenbosch, and forests at Knysna, Natal, Zululand, and the Inhaminga area in Moçambique, in connexion with the planning of the botanic garden.

A seed list containing over 200 indigenous species was produced for 1972 and 102 consignments of seed were sent to botanic gardens and research institutes in many countries. Several overseas and South African research institutes were also supplied with indigenous plant material, mainly for chemical investigations.

Public interest in the garden has increased and the number of visitors has grown considerably. Numerous tours of the garden were conducted for schools and various other interested societies and eight lectures were given by the Curator on landscaping and indigenous plants.

The post of Assistant Curator was filled on the 15th September, 1972.

After several unavoidable delays in the planning stage, excavation of the lake started during September, 1972.

The National Botanic Garden Fund Committee, under the chairmanship of Sir Keith Acutt, K.B.E., met for the first time on the 28th October, 1971, and has held five meetings during the period under review. The Committee has produced a very attractive brochure to aid fund-raising and a campaign to raise money is to be launched when the construction of the lake is further advanced.

BRANCH OF AGRICULTURAL EDUCATION

At the end of the year under review, the Branch concluded the first three-year phase of initiation, development and implementation of its functions and responsibilities within the over-all framework of the Department.

The Chief of the Branch and the Senior Agricultural Education officer continued to be closely concerned and involved with certain Departmental, Ministerial and inter-Ministerial Committees and Working Parties. In particular, the Chief served on the C. S. Davies Memorial Trust Fund Committee of Management, continued as Chairman of the Metrication Council's Functional Committee for Agricultural Technical Services (Agritech), and devoted considerable time to the Ministry of Education Working Party planning for the first Agricultural High School in the country.

Apart from continuing with normal Departmental In-Service Training, including provision for participation by officers of the Tobacco Research Board, in collaboration and with the participation of the Chief and Staff of the Training Branch of the Department of Conservation

and Extension, the Senior Agricultural Education officer was responsible for organizing a number of Public Speaking Courses for over 30 officers of the Department while he also undertook the preliminary investigations and survey, including a visit to CSIRO in Pretoria, in connexion with the proposed Departmental Information Retrieval unit which will provide an important new service for research professional and technical staff. In both respects, it is confidently expected that future seminars, symposia and field days will benefit from improved presentation and communication of research information to all participants, particularly farmers.

The Branch initiated the formation of a Rhodesian Joint Board of Examiners for the College Diploma Courses in Agriculture, and continued to provide assistance and guidance to Gloag Agricultural College and Kukwanisa Training Farm of the Courtauld Trust, organizing the transfer of redundant Government irrigation equipment to the latter. As a continuing function, a detailed review of the past employment opportunities for African Diploma and Certificate holders was carried out and presented to the Secretary for Agriculture, while this matter was also the subject of lengthy consideration with the Ministry of Internal Affairs, particularly with respect to the graduates from Chibero College of Agriculture.

Gwebi Agricultural College

The College year commenced on the 7th October, 1971, with 85 students in residence and ended on the 7th July, 1972.

The demand for places at the College has shown no appreciable increase over the past five years and although the College can only provide accommodation for 85 students, all qualified applicants were offered places at the College and none had to be held over.

Forty members of Course 22 wrote their final examinations and thirty-seven were awarded a diploma of the College of which eight were first class. Of the 45 students making up Course 23, 42 were accepted for entry to the second year.

Good progress was made with the construction of the New Lecture Hall which was completed some two weeks before the end of the College year. The Hall has proved to be well designed and acoustically correct and provides first class facilities for both the student and the lecturer.

Student tours were made to the Eastern Districts, the Lowveld, and the Karoi area as well as to numerous farms, factories and Research Stations in Mashonaland and we are extremely grateful for the help, co-operation and hospitality we received from our hosts.

The students organized and prepared for the Annual Gwebi Ploughing Match and it was extremely disappointing to have to cancel the event because of heavy rain. Arrangements were made for students to compete in competitions organized in other districts and they acquitted themselves well.

The College farm had a satisfactory but difficult year due to heavy rainstorms which lodged part of the maize crop and late rains which affected the early planted groundnuts and delayed maize reaping.

The irrigation scheme is now fully commissioned and has provided a variety of new crops and techniques for student instruction. It has effectively increased the period in which crops can be planted enabling instruction to be carried out over a longer period. The successful development of a borehole in Gwebi South has considerably improved the domestic water supply which is now assured for the forseeable future.

Livestock production suffered a setback due to a serious outbreak of Lumpy Skin Disease which occurred in the cattle in late May, 1972, and resulted in numerous abortions, some deaths and a loss of condition in infected animals. Fortunately few of the Friesland herd were affected and the disease was mainly confined to the beef stock.

Development during the year included the completion of the maize bulk storage shed, a new cattle spray race and handling facilities and a block of African quarters all of which provided students with a wide variety of different construction techniques.

The electrification of the Lecture Hall, and the re-wiring of the farm workshop and poultry section provided students with practical experience in farm electrification and the complete overhaul of two tractors and a full programme of machinery maintenance provided useful material for workshop practice.

We are particularly grateful to the many visiting lecturers in all spheres who assisted the College during the year and enabled us to offer the students a comprehensive and varied course of instruction.

Chibero Agricultural College

Once again the College had a full complement of students with 30 in their first year, 19 in their second year and 31 in their third year at Chibero.

The Minister of Information, Immigration and Tourism, The Hon. P. K. F. V. van der Byl, I.D., M.P., was the Guest of Honour at a well attended Diploma Day Ceremony on the 20th July, 1972. The Minister presented 30 third-year students

with the College Diploma in Agriculture and the St. John Ambulance First Aid Certificates awarded during the last term.

Three new awards were presented at the ceremony, the De Meyere prize for the best Management project in the first year, the Hermes Laboratories floating trophy and prize for the best Veterinary project and the Jersey Cattle Breeders' Society trophy and prize. These awards have stimulated interest in these fields with some excellent projects being produced. These prizes are acknowledged with gratitude.

The final selection of students for entry into Course 12 was made during the last few days of July when 77 candidates spent a week at the College. From these applicants 30 were chosen who had all gained experience by working in agriculture and who had all obviously benefited from so doing. Many of the candidates who failed to get a place have already re-applied and are working on farms to gain more experience, thereby hoping to increase their chances of selection in the future.

The total rainfall for the season, 924 mm, was well distributed and excellent crops were grown. Water planting and wheel track planting of maize was successfully carried out, and with a full dam barley, wheat and potatoes were grown on the irrigation block. Yields of note were, maize 88 bags per hectare, burley tobacco 956 kg from 0,4 hectare, groundnuts 30 bags and barley 60 bags per hectare. Some 18 hectares of star grass pasture was established, bringing the total to 47 hectares—thus ensuring sufficient grazing for the cattle herds and sheep flock.

Mastitis was brought under control in the dairy herd by strict culling of infected animals, but a severe ear infection in May, 1972, affected milk yields which remained at a low level.

The College competed successfully for the Sir Robert Wilkinson trophy for the best Mashona bull judged on his progeny thus establishing the bull Gomo as the best Mashona sire in the country.

Jersey and Mashona cattle were exhibited at the Gatooma and Salisbury shows, with Course 10 and 11 students preparing and parading the animals. One Jersey heifer was champion female dairy animal at Gatooma and Reserve Junior Champion Jersey female at Salisbury. The presentation of the cattle was excellent and was favourably commented on by many observers.

Four blocks of African bachelor quarters were completed by the building section and two more blocks are underway. This has been an excellent exercise for the students in building practice.

In the Engineering workshops a tractor mounted tank for carrying urea/molasses mixture has been built, also two automatic hitches for the Buffalo tractors.

Once again the College acknowledges its debt of gratitude to the many people who by lecturing or visits make the course so much more valuable to the students; and to the many generous sponsors who give encouragement through their scholarships and prizes.

The enthusiastic support and guidance of the College Advisory Council under the Chairmanship of Mr. C. A. Murray is greatly appreciated and gratefully acknowledged.

Esigodini Agricultural Institute

The distribution of rain in the Essexvale area was very uneven during this season. It varied from about 600 mm to 1 066 mm. The total for the Institute was 677 mm which was 17,62 mm above the 30-year mean for this station.

The first planting rains fell on the 11th November, 1971. Planting started on the 13th and was completed by the 25th November, 1971.

The major development projects by the students were the completion of two R26 labourers' cottages, the construction of bachelor quarters consisting of three bedrooms, lounge/dining room, kitchen and bathroom, the construction of an implement shed 40 m by 9,4 m, and the construction of an ablution block in the labourers' village. The foundations and footings of two additional R26 labourers' cottages have been completed and construction will continue next year. The borehole in the Ophir mine area has been completed by the Ministry of Water Development. They were not able to test above 18 200 litres (4 000 gals.) per hour with the equipment available, but an accurate test will be made in the near future and the indications are that this source of irrigation water will be utilized next winter.

Our second Certificate Presentation was held on the 31st July, 1972. The certificate and trophies were presented by our Guest of Honour, Senator J. W. P. Lever.

Fifteen students of the 18 who started Course 2 in October, 1969, wrote the final examinations. Thirteen of these received full certificates of six subjects. One student passed in five subjects and one passed in three out of six subjects. Of the 24 students who started on Course 3 in October, 1970, 18 wrote their final second year examinations and 16 will be returning to complete their training.

Twenty-five students started Course 4 in October, 1971, 23 wrote the final examinations, and 18 have passed their first year successfully.

The 16 students who completed Course 1 in July, 1971, are all fully employed, 12 by Government Departments, three by statutory bodies and City Councils and one by a commercial firm. Three of these students started as assistants on European farms but have since joined Internal Affairs. Of the 15 who completed Course 2 in July, 1972, seven are employed by Government Departments, four by quasi-Government organizations and City Councils and one as an Assistant on a Dairy farm in the Gatooma area. No information has been received yet about the remaining three.

J. C. RAATH,
Director,
Department of Research and Specialist Services

Appendix

Publications 1971/72

Publications by the Department included the following. A full list will be found in the appropriate report of the Station or Branch concerned.

Kemp, Pamela. (1971). Pyrethrum. *Rhodesia agric. J.* 68: 5.

Mowbray, R. M and Lambrou, L. C. (1971). Albumen height a measure of egg quality. *Rhodesia agric. J.* 68: 5.

Rodel, M. G. W. (1971). Neonatal goitre and skeletal deformities in autumn born lambs on Star Grass pastures. *Rhodesia agric. J.* 68: 5.

Blair, B. W. (1971). Recent research on the maize stalk-borer, *Busseola fusca* (Fuller): Influence on control methods. *Rhodesia agric. J.* 68: 6.

Brownlee, J. W. (1971). Crowsfoot picture tells a story. *Rhodesia agric. J.* 68: 6.

Mowbray, R. M. and Lambrou, L. C. (1971). Aids to poultry management. (iii) Poultry lighting. *Rhodesia agric. J.* 68: 6.

Mupawose, R. M. (1971). Sesame *(Sesamium indicum* L.). *Rhodesia agric. J.* 68: 6.

Rodel, M. G. W. (1971). Pasture management at Henderson. *Rhodesia agric. J.* 68: 6.

Toots, H. (1972). Fish preservation. *Rhodesia agric. J.* 69: 1.

Wilson, K. J. (1972). A review of soil dwelling insects that have become important pests of agriculture in Rhodesia. *Rhodesia agric. J.* 69: 1.

Mitchell, B. L. (1972). Termite survey of Rhodesia. *Rhodesia agric. J.* 69: 2.

Rothwell, A. (1972). Groundnut diseases in Rhodesia. *Rhodesia agric. J.* 69: 2.

Rowland, P. E. M. and Cackett, K. E. (1972). A preliminary study of the effects of CCC on spring wheat. *Rhodesia agric. J.* 69: 2.

Toots, H. (1972). Largemouth black bass *(Micropterus salmoides* (Lacepede) 1902). *Rhodesia agric. J.* 69: 2.

Bruce, R. C. (1972). Multiple-cut forage sorghum. *Rhodesia agric. J.* 69: 3.

Steenkamp, J. D. G. and Le Roux, P. (1972). The relationship between crude protein and digestible protein in Rhodesian feeds. *Rhodesia agric. J.* 69: 4.

Weaving, A. J. S. (1972). The cotton looper on coffee. *Rhodesia agric. J.* 69: 4.

Alvord, E. D. (1972). Trials on pyrethrum at Grasslands Research Station. *Rhodesia agric. J.* 69: 5.

Buckle, J. A. (1972). Temperature effect on maize emergence. *Rhodesia agric. J.* 69: 5.

Metelerkamp, H. R. R. (1972). The effect of planting date and irrigation on the development of a late-maturing groundnut variety. *Rhodesia agric J.* 69: 5.

Thompson, J. G. (1972). The re-use of regenerated waters and the reclamation of sodic soils in the south-eastern lowveld. *Rhodesia agric. J.* 69: 5.

du Toit, A. A. (1972). The use of saline waters in agriculture. *Rhodesia agric. J. Tech. Bull. 15.*

Metelerkamp, H. R. R. (1972). Effect of soil properties on water availability to crops. *Rhodesia agric. J. Tech. Bull. 15.*

Metelerkamp, H. R. R., Boundford, L. P. and Wilson, J. H. (1972). Moisture control by means of automatically operated rain-shelters. *Rhodesia agric. J. Tech. Bull. 15.*

van der B. Morkel, W. (1972). Irrigation of coffee. *Rhodesia agric. J. Tech. Bull. 15.*

Wilson, J. H. H. (1972). Water planting of maize. *Rhodesia agric. J. Tech. Bull. 15.*

Herrington, M. D. (1972). The effect of thyroxine and thyroid powder treatment on sheep suffering from thyroid dysfunction. *Rhod. J. agric.* Res. 10: 1.

Weaving, A. J. S. (1972). A preliminary screening trial of insecticides for the control of the coffee leafminer *Leucoptera meyricki* Ghesq. (Lepidoptera: Lyonetiidae) in Rhodesia. *Rhod. J. agric.* Res. 10: 1.

Blair, B. W. (1972). An outbreak of African armyworm, *Spodoptera exempta* (Walker) (Lepidoptera: Noctuidae) in Rhodesia during December, 1971 and January, 1972. *Rhod. J. agric.* Res. 10: 2.

Burley, J., Mills, W. R. and *Morgen, J. F.* (1972). Techniques for measurement of latewood in central African pine timber. *Rhod. J. agric.* Res. 10: 2.

Johnson, P. T. C. and Elliott, R. C. (1972). Dietary energy intake and utilization by young Friesland calves. (1) The energy and dry matter content of calves at four days of age. (2) Digestibility and metabolisable energy contents of whole milk and spray-dried skim milk powder and energy retention of calves given these foods. (3) The utilization by calves of energy in whole milk. *Rhod. J. agric.* Res. 10: 2.

Thompson, J. G. (1972). Occurrence of an acid sulphate soil in Rhodesia. *Rhod. J. agric.* Res. 10: 2.

Barnes, D. L., Clatworthy, J. N., Elliott, R. C. and Rodel, M. G. W. (1972). Suggested sequence of techniques for evaluating pasture species. Proceedings of the Grassland Society of Southern Africa, Vol. 7.

Barnes, D. L. (1972). Defoliation effects on perennial grasses – continuing confusion. Proceedings of the Grassland Society of Southern Africa, Vol. 7.

Clatworthy, J. N. and Thomas, P. I. (1972). Establishment of *Stylosanthes guyanensis* in Marandellas sandveld. Proceedings of the Grassland Society of Southern Africa, Vol. 7.

Davis, A. G. and Hanssen, K. B. (1972). Rhodesia Pasture Seed Growers' Association. Proceedings of the Grassland Society of Southern Africa, Vol. 7.

Rodel, M. G. W. and *Shepherd, J. A.* (1972). Methyl bromide soil fumigation: Effect on grass yield. Proceedings of the Grassland Society of Southern Africa, Vol. 7.

Clatworthy, J. N. (1972). Prospects for pasture legumes in Rhodesia. *Modern Farming*, June.

Visits outside Rhodesia

Biegel, H. M. Plant collecting expedition to Okavango Swamps, Botswana. 20th to 28th January, 1972.

Biegel, H. M. Plant collecting expedition to Okavango Swamps, Botswana. 26th February to 14th March, 1972.

Barnes, D. L. Discussion on Pasture Research with officials of the Institute of Crop and Pastures, Department of Agricultural Technical Services, South Africa. 1st to 3rd March, 1972.

Barnes, D. L. Visited Messina Research Station and various farms in the Transvaal — Roodeplaat and Rietondale Research Stations in the company of officials of the Department of Agricultural Technical Services. 7th to 10th June, 1972.

Blair, B. W. Entomology Symposium, Pretoria, South Africa. Also attended by Dr. J. Brettell, Messrs. W. G. Duncombe and K. Wilson. 27th September to 2nd October, 1971.

Blair, B. W. Attended meeting in Pretoria to discuss matters relating to Southern African Light-trap Grid to monitor species of moth of economic importance. 17th to 21st July, 1972.

Clatworthy, Dr. J. N. Visited the Bunda College, Lilongwe, Malawi, to hold discussions on pasture improvement. 16th to 23rd April, 1972.

Connell, Miss M. A. Visited the Division of Plant Pest Control of the Department of Agricultural Technical Services to gain insight into general plant virus research. 24th to 28th April, 1972.

du Toit, A. A. Visit to the South African Bureau of Standards and CSIR, Pretoria and Onderstepoort to study specialized analytical techniques in the field of pesticides and pesticide residue. 21st May to 2nd June, 1972.

Gledhill, J. A. Visit to Villa Pery, Moçambique, to see commercial application of ultra low volume spraying techniques in cotton. 20th to 23rd March, 1972.

Graham, R. N. Visit to the South African Wool and Textile Research Institute, Port Elizabeth, South Africa, to investigate facilities offered to the Cotton Promotion Council for testing of machinery for finishing processes pertaining to cotton cloth and various other services. 26th to 29th March, 1972.

Hanham, D. P. Visit to various Agricultural Colleges, the Research Council in Pretoria, Fort Hare and the Personnel Department, Northern Goldfields, Johannesburg, to see the latest developments in agricultural education and selection of students for future positions in the agricultural field. 8th to 21st March, 1972.

Hill, R. Visit to the CSIR in Pretoria to study information storage and retrieval techniques. 9th June, 1972.

Holness, Dr. D. H. Invited to present a paper at the South African Society of Animal Production's Annual Conference in Johannesburg. 11th to 14th April, 1972.

Hildebrand, G. L. and Tattersfield, J. R. Visit to the Grain Legume Research Laboratory in Lilongwe, Malawi, to see work done on groundnuts and soyabeans. 27th to 30th March, 1972.

Johnson, Dr. P. T. C. Attended the annual conference of the South African Society of Animal Production to present a paper on "The Energy Intake and Utilization by Young Calves". 11th to 14th April, 1972.

Kemp, P. (Miss). Whilst on leave in the United Kingdom from 7th April to 7th July, 1972, visited the Tropical Products Institute, London; Long Ashton and East Malling Research Station.

Laver, G. Visited various research stations in the United Kingdom, Department of Agriculture in Holland, and a research station in West Germany whilst on vacation leave. 10th April to 7th July, 1972.

Metelerkamp, H. R. R., Saunder, Dr. D. H., Sweet, C. P. M. and Tanner, P. D. Soil Science Congress, Stellenbosch, South Africa. 27th September to 3rd October, 1971.

Muller, T. Visit to Kirstenbosch Botanic Gardens to study organization, development and policy of national botanic gardens in South Africa. 28th May to 11th June, 1972.

Saunder, Dr. D. H. CSIR Symposium on remote sensing. 3rd to 5th May, 1972.

Steenkamp, Dr. J. D. G. Spending nine months at Colorado State University evaluating experimental progression achieved in the long-term genotype-environment. Interaction study in progress at Matopos. Also to investigate various aspects of beef production in extensive areas, and to study the progress in, and the organization of, research in animal production with particular reference to breeding and genetics, mangement and ranch-scale feeding. From 14th July, 1972.

Tattersfield, J. R. Visit to Grain Legume Research Laboratories, Malawi. 27th to 30th March, 1972.

Vorster, Dr. T. H. Visit to Newton Market Abattoir, Johannesburg, to study present South African grading system, which was changed in November, 1971. 12th to 13th April, 1972.

Visitors to Rhodesia

The following were among important visitors to the Department.

Mr. Bruges from Centre for Research on Mechanization of Tropical Agriculture, France. November 1971.

Twenty French cattle farmers from France visited in November, 1971.

Vogt, Mr. N. J. from South African Wool Textile Research Institute visited the Gatooma Research Station, January and February, 1972.

Altona, Dr. R. E. from AE & CI, South Africa, visited the main research stations to see the use of nitrogen in agriculture. January, 1972.

Schwabe, Prof. W. W. from Wye College, United Kingdom. Research planning, organization and training. January, 1972.

Five agronomists from Fedmis Co., South Africa, visited the main stations to see agronomy and fertilizer usage. February, 1972.

Eighty members of a "Western Livestock Journal" party from the United States visited Henderson, Chibero Agricultural College and Matopos Research Station to see farming in Rhodesia, particularly livestock. February to March, 1972.

Taylor, Dr. and party of eight, on a People-to-People Tour from the University of North Dakota, United States, visited Salisbury and Henderson Research Stations. February, 1972.

Maize study group of 12 from South Africa visited Grasslands and Henderson Research Stations and the Seed Maize Association. February, 1972.

van Heerden, Dr., from South Africa, Department of Agricultural Technical Services visited Gatooma Research Station regarding cotton breeding. February to March, 1972.

Schoorel, Dr., from International Seed Testing Association to discuss seed testing. February to March, 1972.

Ruthenberg, Dr. H., from the University of Hohenheim, Germany, to discuss smallholder agriculture and agricultural economics generally. March, 1972.

Coaton, Dr., from South Africa, Department of Agriculture, to discuss termite survey of Rhodesia. March, 1972.

Mr. Kalinga and Mr. Lungu from the Malawi Government, visited Salisbury, Henderson and Grasslands, Kutsaga and Chiredzi to see agronomy research. April, 1972.

Gregory, Dr., from Australia visited Matopos Research Station to discuss animal husbandry. April, 1972.

Munro, Mr. J. M. from Malawi Ministry of Agriculture, visited Gatooma Research Station to discuss cotton breeding. April, 1972.

Mr. van Vuuren and Mr. Neethling from the Division of CSIR, South Africa, visited Research and Specialist Services Head Office to discuss techniques. April, 1972.

Tunstall, Mr. J. P. from A.R.C. in Malawi, visited Gatooma, Salisbury and Chiredzi Research Stations to see cotton growing and agricultural research. May to June 1972.

Mr. Thorn from South Africa, visited Chiredzi, Sabi, Honde Valley and Rhodes Inyanga to discuss papain production. May to June 1972.

Joubert, Dr. D. from SARCCUS, South Africa, visited Henderson Research Station on SARCCUS matters. May to June 1972.

Graven, Professor E. from Fort Hare, visited to discuss agronomy. June, 1972.

Mr. Lee and Mr. Chingoma from the Malawi Government, visited Salisbury, Henderson, Grasslands, Kutsaga and Chiredzi, interested in agronomy research. July, 1972.

Canvin, Professor D. T. from Queens University, Canada, visited to discuss plant physiology. July, 1972.

Wallace, Professor from California, United States, a plant pathologist interested in viruses. September, 1972.

van Wyk, Mrs. from CSIR, South Africa, interested in Techno-economic evaluation. September, 1972.

Annual Report of the Director of Conservation and Extension

for the year ending 30th September, 1972

INDEX

	Page
ORGANIZATION AND STAFF	34
Organization	34
Establishment: Senior staff	34
Junior staff	34
Posts	34
Housing	34
Water supplies	34
Transport	34
Visits to other countries	33
Boards, committees, conferences and meetings	34
Staff training	34
THE YEAR, THE LAND, DEVELOPMENT AND PRODUCTION	
The weather	34
Soil conservation	34
Veld management and pastures	35
Bush encroachment	35
Veld fires	35
Planted pastures	35
Water conservation	35
Field trials and demonstrations	36
Livestock and grazing trials	36
Critical crop trials and demonstrations	36
Fertilized pasture trials	36
SPECIALIST BRANCHES SERVICES	
Engineering	36
Agricultural Engineering Centre	36
Tillage trials	36
Machinery development and testing	37
Vlei drainage	37
Extension: Mechanization	37
Farm buildings	37
Conservation	37
Engineering training	37
Conservation Working Account	38
Husbandry	38
Agronomy	38
Apiculture	38
Irrigation	38
Irrigation trends	38
Advisory work	39
Irrigation training	39
Investigation and development	39
Training	39
Recruits	40
Domboshawa Training Centre	40
Mobile Training Unit	40
Extension research	40
Home Economics	40
Publications	40
Youth Extension	41
Farming inquiries from outside Rhodesia	41
Planning	41
Regional plans	41
Farm plans	41
Soil surveys	42
Settlement surveys	42
Farm management and work study	42
Maps for veld management plans	42
Field services	42
Field staff activities	42

	Page
CROP PRODUCTION	43
Field crops	43
Tobacco: Flue-cured	43
Burley	43
Cigar filler	43
Maryland	43
Fire-cured	43
Oriental	43
Maize	43
Sorghum	44
Wheat	44
Barley	44
Rice	44
Groundnuts	44
Soya-beans	44
Edible beans and peas	44
Potatoes	44
Cotton	44
Sugar cane	44
Sunflowers	45
Seed beans	45
Horticultural crops	45
Deciduous fruit	45
Citrus	45
Other fruit crops	45
Nut crops	45
Vegetables	45
Papain	45
Coffee	45
Tea	45
Pyrethrum	45
Fodder crops	45
Other crops	45
LIVESTOCK	45
Cattle	45
Beef cattle	45
Beef cattle in purchase lands	46
Beef Performance Testing Scheme	46
Bull Approval Scheme	46
Dairy production	46
Sheep	46
Pigs	47
Fish	47
Rabbits	47
Livestock Improvement Committee	47
CONCLUSION	47

ORGANIZATION AND STAFF

Organization

A working party under the chairmanship of the Assistant Director (Field), has made recommendations for reorganizing the Department, and these are presently under consideration.

Establishment: Senior staff

Twenty-seven officers resigned during the year.

Vacancies at the end of September were as follows:

Conservation and extension officers . .	9
Subject matter specialists	4
	13

There were 24 appointments during the year.

Junior staff

A small number of vacancies resulted from resignations and discharges. No difficulty was experienced in filling these posts.

Posts

A new post, that of Grain and Herbicide Specialist, was added to the establishment.

The six-post establishment of the Pests and Weeds Section of the Husbandry Branch was transferred, with its function, to the Ministry of Lands. Two Planning Officer posts were surrendered. The staff position in the Central Planning Team has improved; three of five vacancies have been filled. Recruitment and retention of suitable professional officers for the Land Use Planning Section is still a problem.

Housing

Funds were provided for the construction of quarters for one European officer at Enkeldoorn, but this was only a small contribution towards the total housing needs of the Department.

The provision of adequate housing for African staff continues to be a major problem. No funds were allocated for this purpose in this financial year.

Funds for the maintenance of housing are also inadequate.

Water supplies

Guttering and tanks have been installed at 40 African quarters. Additional funds are still required for this purpose.

Transport

Present mileage rates are still considered to be inadequate although an extra cent per mile has been authorized for vehicles operating on dirt roads.

Visits to other countries

These show an increase over last year and are listed in Appendix I. In particular, the number of visits to Malawi has increased.

International contacts continue to play an important part in Departmental development and staff-development programmes.

Boards, Committees, Conferences and Meetings

The Department is represented on almost every one of the numerous councils of the agricultural industry. Details are shown in Appendix IX.

Staff training

In addition to the programme of training necessary to maintain the technical efficiency of the Department, senior staff (Group Officer upwards), are undergoing management training organized by the Public Services Board. So far 22 officers have attended the PSB courses and found the training useful in improving operational efficiency and objectivity. The association with other ministries, departments and civil-service colleagues working in different avenues, is a broadening experience for officers who attend these courses.

THE YEAR, THE LAND, DEVELOPMENT AND PRODUCTION

The weather

The 1971/72 season was the best for many years. Early rains fell and distribution was fairly good. In Matabeleland certain districts were relatively dry until good rains fell in January.

Late rain in April had an adverse effect on some horticultural crops. This, coupled with cold weather in June and early August, hampered the growth of potatoes and tomatoes. August frost damaged winter cereals in the southern section of the country and coffee trees were also affected. Temperatures of minus 9°C were recorded in parts of Victoria. Indigenous vegetation suffered mild damage.

None the less, it was generally a "bumper" season.

SOIL CONSERVATION

All provinces report improvement in mechanical conservation. A decrease in the number of requests for re-pegging followed the introduction of stronger discipline concerning conservation works.

Reports from all provinces confirm the usefulness of aerial flights in pinpointing soil erosion and the initiation of action by ICA committees.

The spread of significant conservation practices is encouraging; mulching of coffee is common-

place in the Eastern Districts; tillage methods for conserving moisture are being increasingly applied; intensively cultivated smaller farms are working within specialized conservation layouts; and the protective maintenance of artificial waterways is now, frequently, a routine task.

Mashonaland North reports a reduction in erosion, possibly attributable to favourable rains. However, smaller farms are often over-cropped; if unchecked, this will tend to accelerate erosion.

Use of wet land is a focus of interest. Vlei cultivation continues and yields of maize were above average. This use of vleis may be hampered next season since conditions are still too wet for successful cultivation.

There has been a concerted drive to peg conservation layouts on land cultivated by African labour on European farms.

The special conservation requirements of irrigation schemes have been highlighted by the heavy rains. The correct planning of layouts to conform with conservation criteria is essential and demand for this kind of plan is increasing.

An increasing interest has been evinced in early and better ploughing, and conservation-cropping practices in African areas.

Generally the pegging backlog has been eliminated.

The summary of mechanical conservation works (at Appendix V) shows a marked decrease in the area of arable land protected. This trend is followed in all provinces except Matabeleland where the reverse applies. All other figures show a reduction except for the increase in roads pegged. Conservation works pegged and constructed have decreased from 1 800 km last year to 888,30 km in this.

Veld management and pastures

Interest in veld management is widespread. Impetus has now moved to African purchase lands where enthusiasm is encouraging, and improvements in grass cover are spectacular. As could be expected, the first exuberant enthusiasm for veld management is being replaced by steadier and quieter application of principles. Early adopters and innovators have largely completed their veld-management development, whilst neutrals are watching trends before they accept the methods recommended. Contributory factors such as high turnover of field staff and lack of finance are limiting progress in local situations.

Steady progress has been made in veld-management planning; 34,4 per cent. of the farming areas are now planned. However, there has been a reduction in the area planned during the reporting year. This is partially the result of consolidation and follow-up of existing plans. An urgent need for a clearer appreciation of the principles of veld management before embarking on further planning has become apparent.

Reclamation of badly degraded veld presents a serious problem, particularly in lower rainfall areas. Overstocking is reported by all provinces. A number of destocking orders have been served under the terms of section 47 of the Natural Resources Act.

Veld management recording remains a weakness. Few farmers keep records and it is therefore difficult to accurately evaluate the management practices that are being employed.

It is possible that changes in emphasis and approach are needed to achieve a better rate of progress in veld management; it may be that more attention should be given to developing the farmers' knowledge and understanding of the veld, and less to the adoption of any particular management system.

Bush encroachment

Bush encroachment is being dealt with on some farms, and there are no new developments in this field. Increased grass production has been spectacular where farmers have cleared significant areas of bush.

In areas where bush is not a limiting factor to production, the approach has continued to be that veld management should precede any bush-clearing programme.

Bush encroachment is most severe on the heavy soils in the lower rainfall areas; in many cases bush is so thick that the land is almost worthless for grazing. Reclamation, while expensive, could well be cheaper than buying more land. More information is needed on the economics of large-scale clearing and the cost of controlling regrowth. Long-term finance (with no repayments during the initial years), will be needed if this means of expanding production is to be exploited.

Veld fires

Veld fires have not been a problem and have occurred mainly in less-settled areas.

Planted pastures

Interest in fertilized pastures is increasing with specific emphasis on the production of chiller contract beef. This means of production is attractive where efficient and inexpensive irrigation systems are possible. However, economics must be carefully considered.

WATER CONSERVATION

The number of dams and weirs constructed under direct Conex supervision is declining each year: 286 in 1969/70, 276 in 1970/71 and 192 this year. The average capacity of dams constructed

this year is 35,10 m^3. However this is not a true reflection of the total farm-dam situation since these figures do not include dams constructed under the supervision of private consultants. Larger dams are being built and this tends to move the responsibility for design away from the Department. Private consultants seem pleased to accept farm work.

Surface water supplies have been good this year. Most dams spilled. Matabeleland reports that several dams breached during heavy rains in February; bad maintenance of the structures was the main cause of failures.

A considerable number of dams have been pegged in the purchase lands. Mainly, these are being built using ox-drawn dam scoops. Those constructed using Conex units frequently turned out to be expensive because sites preferred by the farmer were chosen for convenience and little attention was paid to other factors related to economics of construction.

A water survey of the Marandellas group has commenced. A survey conducted by the Ministry of Water Development revealed that few sites for major dams exist in the Chipinga district. In consequence, a number of requests were received for the investigation of farm-dam sites.

FIELD TRIALS AND DEMONSTRATIONS

Livestock and grazing trials

The Masera and Lupane trials, from which nothing of significance has emerged in recent years, have been terminated.

The Tuli grazing trial shows increased grass cover in all paddocks, but no conclusive evidence to support either split or short-duration grazing treatments.

The effect of free-choice minerals is being observed on Annandale Ranch, Somabula.

At Chibero College, live animal and carcass cutability correlations are being studied as is the applicability of the Australian carcass-appraisal scheme.

Critical crop trials and demonstrations

No critical trials, as such, have been conducted. However, a number of observation trials in various parts of the country were undertaken to study the water-planting of maize and the production of winter-wheat on wet lands. Results are encouraging.

Whole-farm demonstrations have generally been found to be suited for demonstration in purchase lands.

Fertilized pasture trials

These have been undertaken at the following sites: Mushangwe, Wenimbe ICA; Merroleigh, Chipinga ICA; Marere, Trelawney ICA; Avondale, Angwa North ICA; Atherstone, Limpopo ICA.

(i) The toxicity of nitrate nitrogen in herbage in relation to fertilizer application is being studied at Merroleigh.

(ii) Marere has shown the need for boron on fertilized pastures on granite sandveld; the advantages of rotational grazing, both animal and pasture, and the need for supplementary irrigation.

(iii) The performance of various grass species under irrigation is being investigated at Atherstone.

(iv) At Mushangwe, the trial concerns the integrated use of planted pastures with veld and crops in beef production.

Veld observation plots and transects are being studied to note ecological changes in the Chiredzi, Nuanetsi, Sessombi and Battlefields ICAs.

Research into the biological stabilization of mine dumps is being conducted by the Department.

SPECIALIST BRANCHES SERVICES

Engineering

The demand for engineering services continues to increase, especially from commodity associations of the RNFU needing field investigations of mechanization problems as opposed to engineering tests. These latter are carried out by the Standing Committee for Agricultural Mechanization (SCAM). At present it is not possible to meet all requests by these associations for this type of work.

Agricultural Engineering Centre

The Agricultural Enginering Centre continues to develop within the limits of available funds. Now that the tillage and machinery development and testing sections are firmly established, a start has been made to provide facilities for conservation engineering training. These facilities are mainly field demonstration plots and working models which enable limited conservation staff to cope with the ever increasing training needs of the Department and those of the Ministry of Internal Affairs.

Tillage trials

Depth of ploughing trials, started in 1964 in different parts of the country, are now in their final stages. Results from these trials are being analysed and prepared for publication. These results have provided basic criteria for the farming community in so far as tillage is concerned,

and have also provided guidelines for the establishment of various minimum-tillage trials.

Frequency of ploughing trials—established at Domboshawa on sandveld in an endeavour to reduce the tillage operations necessary for tribal areas—have now been extended on a non-critical basis to include low-rainfall areas throughout the country. Results in the lower rainfall areas are more encouraging than are the critical trials at Domboshawa. Although these dispersed trials have been operating for only one year, their success has created a demand for the specialized equipment used in the trials but not yet commercially available. This equipment is being developed in conjunction with SCAM and local industry.

Machinery development and testing

The work of this section is divided approximately equally between mechanical testing on behalf of commodity associations and Government departments. The tests for SCAM have been mainly concerned with grain conveying equipment and, to a lesser extent, with specialized machinery including that required for tobacco and irrigation. The main work for the commodity associations has been the continuation of the grain-drying programme. A sophisticated research drier was made in the SCAM workshop. Its use will enable basic criteria to be established, and so help manufacturers and farmers to design efficient driers in so far as quality and economy are concerned. Demand for the development of specialized machinery for other Government departments, especially the Ministry of Internal Affairs, has increased considerably. Most of these projects have been undertaken in co-operation with SCAM which provides the basic workshop facilities; equipment is supplied by trade members.

This year saw the final of the improved ox-plough competition. This was organized jointly by the Ploughing Association of Rhodesia — which provided a silver medal—and the Ministry of Internal Affairs which donated a $1 000 cash prize. The winning plough is vastly superior to its predecessors; the increased production cost is small in relation to the improvements. This new plough will probably be in production in 1973. It is hoped that a new Central African Standards specification will be established and adopted by local manufacturers, and thereby ensure the quality of future ploughs.

Vlei drainage

Analysis of data collected over 10 years has started. The research programme of those years is being replaced by a more up-to-date project; an engineer is presently overseas studying this specialized subject. It is expected that the new work will start towards the end of 1973.

EXTENSION

Mechanization

Demand for technical services concerning mechanization exceeds our capacity to respond. Many requests for field investigations—mainly from commodity associations—have aggravated the situation. Staff and financial stringency limited almost all the extension work to Mashonaland.

Farm buildings

Numerous requests were received for advice on farm-building design and construction. Mainly, these referred to bulk handling of maize, coffee pulperies, flue-cured tobacco, piggeries, farm abattoirs and labour housing. The Senior Farm Buildings Architect visited the Department of Agricultural Technical Services and the Building Research Institute in the Republic of South Africa, to study development in farm-building design and construction. This visit provided valuable information.

Conservation

Newly appointed graduate officers in this section have been given additional training and experience to ensure that a positive approach is made to conservation extension. A start has been made by up-dating existing conservation literature, and by the provision of new and basic engineering data. These publications will contribute to a more scientific approach to conservation engineering and will also be used as a basis for conservation training.

Engineering training

The Farm Machinery Training Centre at Domboshawa conducted 31 courses attended by 332 trainees. The number of courses is almost equally divided between Conex staff, Ministry of Internal Affairs staff and the farming community. However, the number of people attending these courses are divided approximately equally, in terms of man/days, between the farming community and Government departments. The number of Conex staff attending courses was approximately 33 per cent. of all Government departments, the Ministry of Internal Affairs being the greatest single user of the facilities.

The number of European farmers attending courses has increased substantially. For the first time in several years, the two courses scheduled for this category have been fully booked and some applications have been deferred until next year. Soil and water conservation is now included in most of the training. In addition the Conservation Section conducted three courses for Departmental staff and two for staff of the Ministry of Internal Affairs. These courses have a more practical bias. The supporting use of demonstra-

tion plots and working models at the Agricultural Engineering Centre should make future courses more effective.

The Farm Buildings Section organized one course for the Ministry of Internal Affairs.

Conservation working account

The volume of work requested by farming communities in the Midlands, Matabeleland and Victoria provinces has not increased, and the account has run at a loss for the third successive year. Consideration is being given to restricting Working Account operations to the higher rainfall areas.

A total of 74 dams were constructed for farmers in European areas, and seven in African purchase lands.

Productive hours were over 16 000 compared with under 15 000 in 1971–72.

The trading account closed at the end of the financial year, showing an overall profit of approximately $6 000. Units based in Mashonaland showed a profit of over $12 000, but this was offset by the loss of over $6 000 sustained by units based in the Midlands.

HUSBANDRY

The Pests and Weeds Section was transferred to the Ministry of Lands on the 1st July, 1972. The Section had heavy responsibility and the fact that no serious outbreaks of diseases or pests occurred during their service with Conex, is a tribute to the efficiency and dedication of its officers.

Specialist officers devoted much time to staff training and active participation at field days and discussion groups. A large number of technical articles were written for the agricultural press. The demand from farmers for specialist advice, on all aspects of production and for specialist attendance at field days, has further increased.

The Farmers' Co-op Floating Trophy for outstanding contribution to the Rhodesian oilseed industry, was awarded to the Department's Oilseeds Specialist and serves as an example of the value of extension as a complement to practical farming.

Agronomy

Interest in the use of wet land increases. However, in consequence of the long wet season, these areas have remained extremely wet well into the harvesting period, causing problems in the transport of reaped maize from the fields.

Another problem, manifested by the lengthy wet season, was the lodging of short-season maize. A swing away from the shorter season varieties is likely, perhaps unwisely, as a result of lower yields and excessive lodging.

Research and extension have made spectacular breakthroughs in the production of irrigated groundnuts. Considerable interest in this crop is apparent. If the necessary machinery for lifting and reaping becomes available, irrigated groundnuts may become one of Rhodesia's most important and profitable summer crops.

The future of the soyabean industry appears to depend on higher prices. It is reasonable to predict that local processing of the crop would ensure improved prices.

Interest in scouting cotton pests has increased; it is hoped that farmers will become more involved in special scouting exercises next season, and place greater reliance upon trained scouts.

Apiculture

Shortage of honey and the consequent big demand for it have encouraged many people to start keeping bees. An estimated 550 tonnes of honey were produced during the past year, but still does not satisfy demand. Commercial firms are prepared to invest money in honey and beeswax production in African areas.

The start of vital research into controlled mating of honey bees in an encolsure was delayed the new mating tower has not yet been completed.

IRRIGATION

Irrigation trends

The year has seen a marked swing towards the use of *lay-flat* polythene tubing by flood irrigators, especially in the Midlands and Matabeleland. Various types of gates and "socks" are in use to regulate the flow from *lay-flat* tubing into planting furrows, and most operate satisfactorily. The general consensus of opinion is that *lay-flat* provides for reasonably inexpensive yet highly efficient water conveyance and distribution. This system is here to stay.

The Israeli system of drip irrigation has not found favour with local farmers. Despite the considerable interest initially aroused, on closer examination the system did not turn out to be the panacea for all problems, as claimed by its promoters. However, notwithstanding high cost it has merit, especially when applied to widely spaced crops such as coffee, tea and deciduous fruit.

Farmer interest is currently focused on *drag line* and *permaset* systems, both of which have stood the test of time elsewhere in the world and are comparable in cost to conventional sprinkler systems. Both are suited to Rhodesian conditions and can easily be adapted to meet the demands of coffee and deciduous fruit growers of the eastern districts.

Considerable interest has been shown in groundnuts grown under irrigation as a rotational crop. Growers in all parts of the country have demonstrated conclusively that the gross return from irrigated groundnuts outstrips that of any other irrigated crop for which a market is assured.

Advisory work

Irrigation specialists in all provinces report that they have found it difficult to meet the volume of requests for advisory visits. They can seldom find time to make necessary follow-up visits, essential both to the farmer and the specialist. The need for additional specialized staff is great; despite this, the standard of irrigation practised in Rhodesia, though not perfect, compares favourably with that of the more sophisticated countries of the world.

Hatcliffe Irrigation Equipment Testing Centre, now in its second year of operation, has proved successful in identifying design problems to the mutual benefit of both farmers and commercial manufacturers and suppliers. The number of requests from irrigation firms for information on specific design problems has been most encouraging.

In all, 135 tests were made, either of single sprinklers or comparative tests of locally made and imported sprinklers.

Two ranges of sprinklers made under local trade names have been submitted to full discharge tests.

As a result of investigation studies, numerous short reports were made on subjects such as triangular versus square spacing of sprinklers; the effect of wind on various pressures, spacings and nozzle diameters; the effect of the number of beats per minute (spring tension) on the pattern of water distribution, to mention only a few of the studies carried out.

The effect of pressure and nozzle diameter on droplet size is being investigated, as is the relationship between droplet size and soil encrustation. From these results it may be possible to recommend maximum permissible precipitation rates about which very little is known at present.

Liaison with commercial firms is good and the results of studies and tests—unless of a confidential nature—are passed to as many interested parties as possible.

Irrigation training

Four courses were held during the year. Two of these were of 10 days' duration and were held for Conex officers and Internal Affairs officers respectively. The other two courses, each of five days' duration, were held for extension assistants of the Department and for irrigation managers from Internal Affairs.

Investigation and development

The Ministry of Agriculture Irrigation Development Committee—which is chaired by, and consists largely of, officers of the Department — has concerned itself with investigation and reporting on proposed national schemes. A final Project Report on the Umwindsi-Lion's Head Scheme was submitted to the Secretary for Agriculture, and interim reports on the Odzi-Osborne and Arcturus schemes have been completed.

Investigational work is currently in hand for the Lesapi Dam Scheme, the Odzi-Osborne Scheme, the Murodzi complex and the Gwelo River Scheme.

TRAINING

Eighteen courses for Conex officers included six obligatory courses—Conservation, Land-use planning, Extension methods, Veld management, Farm-management principles, Contour construction — and courses dealing with such subjects as agro-meteorology, rural sociology and programme planning.

Ten courses were organized for the Ministry of Internal Affairs and includeed, among other subjects, extension methods, conservation and dam construction.

A full programme of public-speaking courses has been arranged for the Department of Research and Specialist Services. Three of these courses have been held; a request has been made to expand the content of future courses to include extension writing and the use of audio-visual aids.

A feature of the year's training has been the introduction of objective testing. Pre- and post-course testing is now established procedure in most courses. This innovation has had the desired effect of slightly raising course pressures. Participant concentration is improved and subject presenters have become more objective in their teaching, being disciplined by the questions they are obliged to design to accompany lectures. Analysis of these tests after each course gives a very clear indication as to what, if any, improvements need to be made.

Training courses for Conex staff have totalled 959 trainee/training days. Internal Affairs courses have accounted for 1 034 trainee/training days and those for Research and Specialist Services 108 trainee/training days. The figures quoted for Conex and Internal Affairs show a slight increase over last year. The courses for Research and Specialist Services are a new venture.

Analysis of all these figures show that Conex officers spend approximately 2 per cent. of their time in training.

Training Branch officers have been fully committed giving lectures to do with extension, com-

munication, newsletter writing, supervision and rural sociology. During the year there was only one week in which no bookings were made for training in the Conex Training Hall.

Recruits

Fifteen recruits were received into the Department through Training Branch, where they were given orientation and induction training.

The evaluation and analysis of all extension programme plans, submitted from districts, have been carried out by Training Branch staff.

Domboshawa Training Centre

The number of courses for African staff and the number of staff participants decreased from 25 and 411 respectively in 1970–71 to 17 and 309 this year. To some extent this decline is accounted for by subsistence and travelling fund limitations. However, the number of Veterinary courses for APL farmers was increased from 6 to 8 and the number of participants increased from 174 to 289.

During the Veterinary courses and Livestock courses for staff, extensive use was made of the Domboshawa farm. A small grazing scheme was initiated and will be ready for demonstration purposes next year.

Mobile training unit

Operating from Domboshawa, the unit has given active support to a wide variety of field training days and courses. Fifteen separate tours were made covering 21 weeks, during which period 21 029 people were contacted.

Extension research

After initiating research to find indices of basic agricultural practices in the Tribal Trust Land, the Extension Research Section handed over this project to the Ministry of Internal Affairs. Techniques for gathering information of this kind have now been perfected.

An investigation into African Purchase Land Farmers' Sources of Information was completed and a report submitted. This has given guidance for improving the information flow to African Purchase Land farmers.

Three surveys of African purchase land farmers were undertaken to ascertain age pattern.

A Sociometric Survey was conducted in the Gwatemba African Purchase Land and a report is in preparation.

The Senior Extension Research Specialist has been loaned to the Tribal Areas of Rhodesia Research Foundation for two years and is presently not working for Conex.

Home economics

The Department has temporarily lost an important catalytic aid to its main extension function.

During the year the Home Economics Officer resigned. The vacant post is, for the time being, frozen. However, a demand for advice on home economics topics continued throughout the year. A large number of illustrated leaflets produced by the Home Economics Section were sent out in response to requests from all over the country and even from beyond its borders.

Publications

The Publications Section is highly productive and presently overburdened, established with only one Publications Officer and two Assistant Publication Officers. Occasional assistance is given by other members of the Training Branch.

The Nhau dzvarimi and the Izindaba zabalimi weekly radio programmes in Shona and siNdebele respectively have continued for over six years. RBC regard these as the most popular programmes on the African Service. Fifty-two scripts were prepared and supported by recorded interviews with farmers. The Matabeleland interviews were not as well received as those broadcast in Shona. This is attributed to the fact that the siNdebele interviews are not conducted by trained agriculturists.

Listeners often write to the presenters of these two programmes (the Assistant Publications Officers) and this correspondence frequently suggests topics for further programmes.

Other material collected by the Publications Section is used in English language broadcasts of the General Service of the RBC, particularly in the programme Farmers' Notebook.

Much similar information is published in the national press and in farming journals. In all, 83 news items were provided during the year and in addition 425 Farming Reminders were issued to the press and RBC.

In the preparation of papers and publications the concept of an omnibus Agricultural Handbook has given way to individual handbooks prepared by each specialist branch or discipline. Work has started on these new handbooks.

Publications specially directed at European farmers included Hortus (a bi-annual), Water in Agriculture (a large booklet) and Farming in Rhodesia. Hortus is now made up entirely in the Publications Section of the Department and printed on the VariTyper machine. It is a prestigious production which includes photographs and line drawings. The Sixth Annual Report of Farm Management Data (August, 1972) was

printed by this machine for the Branch of Economics and Markets, as were two reports for the Ministry of Water Development; forms were also printed for the Ministry of Internal Affairs and "A Guide to Air-photo Interpretation" for the Department.

Of the Department's publications listed at Appendix II it should be noted that an important booklet dealing with groundnut production was prepared and published at the request of the Ministry of Internal Affairs. Directed at African farmers, 5 000 copies were printed and it is already being reprinted.

Kunzwa-Ukuzwa, the newspaper for farmers in the Purchase Lands is now printed and published by Conex. Five editions have been produced during the year.

In addition to direct publications, the Section distributes to staff a large quantity of printed material, which has originated elsewhere. This service is also extended to the Ministry of Internal Affairs.

Youth Extension

Since better salaries are paid to teachers, difficulties are being encountered in recruiting Youth Extension Specialists from their ranks and retaining incumbents from that source. There is ample evidence to support the eventual need of one Youth Extension Specialist in each province if both European and African schools are to be serviced.

The extent and type of work being done makes it clear that qualified personnel, preferably with teaching experience, is needed to fill these posts.

All meetings of the Young Farmers' Association at national and regional level were attended. Assistance was given by supplying certain requirements for the YF/NR camp held at Inyanga.

During the year the Department was represented at meetings to determine the future of the YF/NR movement. YF/NR is to provide an umbrella for both the African and European clubs. At club level, different interests dictate a split in the movement.

The number of clubs in those areas serviced by this department are as follows:

Mashonaland North and South	49
Matabeleland	24
Manicaland	27
Victoria/Midlands	45
Total	145

Conservation Education continues to be the main activity of the Section. The Department continues, as in the past, to develop the annual theme adopted by the Natural Resources Board. The 1972 theme is pollution.

Lectures, exhibitions, field trips, etc., have all had the objective of creating awareness of pollution as a threat to Rhodesia.

The Department assisted the Ministry of Education (Audio Visual Services) in the production of a series of wall charts depicting causes of pollution; 15 000 copies of each were produced and distributed to schools. Four exhibitions were organized by the Department on behalf of provincial education committees. These were attended by 15 500 children and 195 teachers.

Assistance was also given in the organization of three symposia on pollution, attended by 289 teachers.

In senior schools the College of Preceptors Examination (COP) is to be replaced by the Rhodesian Certificate of Education (RCE). The Geography syllabus requires the pupil to undertake a farm or an area study. Teachers are requesting assistance from the Department in this connexion.

Junior school teachers (especially Standard V) are starting to do field work with their pupils. The Department is frequently asked to assist by organizing and conducting farm visits.

Farming inquiries from outside Rhodesia

One hundred and forty-eight inquiries originating from 18 different countries were received, 99 by correspondence and 49 by personal visit.

PLANNING

Regional plans

The Marandellas Regional Survey was revised and published. The Mazoe Valley Regional Survey was also revised and will be published shortly.

The Busi Catchment Survey was extended to include the Lusitu catchment; survey work has been completed and the report is ready for publication.

Two other regional surveys are in process. The Mutema Tribal Trust Land Survey (53 200 hectares) will be finalized as soon as the 1972 aerial photography covering the area has ben received and studied. Field work for the Battlefields ICA survey is nearing completion; this is part of a larger survey covering all four ICAs of the Que Que group.

Farm plans

The demand and production of land-use plans continues to fall. During the year, 33 farm plans were completed, a few were revised and a number of new plans are in hand. Greater emphasis continues to be placed on veld-management plans in preference to full farm or ranch plans. It is

expected that the introduction of charges for farm planning will reduce the demand to an even lower level.

Following staff training in the purchase lands, very good progress has been made with air-photo interpretation and preliminary land-use survey work in Marirangwe, Ziyambe, Tzonzo, Rowa, Chinyauwhera, Chinyaduma, Tamandayi, Sabi, Chesa, Tanda and Karuyana purchase lands.

Soil surveys

Numerous soil surveys were undertaken for small-scale irrigation development, sewage-effluent disposal works and for coffee, tea or deciduous-fruit production.

Settlement surveys

Reports on Mtoko and Umsweswe State Lands were revised in terms of new land-settlement policies. Surveys of Umfurudzi, Whunyani and Wiltshire State Lands were completed. Numerous viability surveys of vacant land in purchase lands were conducted and consolidation recommendations made to the Branch of Agricultural Land Settlement.

Farm management and work study

Assistance was given to farmers in the Economics and Markets recording scheme and to Management Advisory Service (MAS) clients, who were helped with interpretation of cost data and preparation of forward plans within their farm-resource constraints.

Numerous farm-management and work-study investigations were undertaken. A further investigation into post-maturity maize losses was undertaken for the Grain Research Liaison Committee. Results from plots on some 20 farms are being analysed.

A survey of the critical moisture range for bulk storage of seed cotton has been continued for the second season.

A booklet summarizing available information on recent area crop yields and the range of crop yields attained by individual farmers within specific areas, was produced. This booklet was prepared from information supplied by the Central Statistical Office which also provide duplicate computer sheets of the main census-analysis programme. In addition, information relating to variable costs of production, in the form of standard cost-curves, was supplied.

A large computer exercise was undertaken in an attempt to ascertain the relationship between measures of season length and quality, and area crop yields (maize, cotton and tobacco).

Investigations were also carried out in numerous other fields, including the handling of burley tobacco, mechanical harvesting of cotton, tobacco-grading methods and productivity and labour requirements for various water-planting techniques.

Data from some 130 African purchase land farms was analyzed. A booklet is being prepared summarizing results of the 1970–71 recording year. Information relating to the gross margins of numerous purchase land enterprises will be given.

Maps for veld-management plans

Topographers drafted approximately 740 maps for veld-management plans produced during the year and, in addition, many veld-management plans were revised.

FIELD SERVICES

Field staff activities

ICA committee enthusiasm and achievement has varied greatly. The main activity of committees has been follow-up of problem areas pinpointed by ICA flights. Reasonably good progress has been made in isolating some problems and as an indication of a tougher attitude developing, more farmers have had orders placed on their properties in terms of Section 47 of the Natural Resources Act. However, there is still reluctance to make use of NRB Orders until a lot of time and effort has been expended on persuasion.

Although in theory ICA committees draw up programme plans, in practice the extension officer makes the plan after discussion with the committee. However, extension programme planning has generally given purpose to the job and this approach will become increasingly important as evaluation begins to show gains or failures.

The work done by ICA committees is the backbone of conservation in Rhodesia, making it a local, community responsibility. However, some committees find it difficult to stimulate neighbourly interest in conservation problems. This is regrettable, for committee members can ill afford the time they put into this work if the effort is going to be wasted.

In October, 1971 Midlands Province was authorized to introduce specialization of staff, on a trial basis at field level. Staff efficiency and enthusiasm have improved noticeably and the "change" has been well received by the farming community.

Several officers acted as cattle stewards at Salisbury Show and others helped at local shows and ploughing matches. Many officers and their wives judged at African purchase land shows.

Farm visits continue to be the most important method of extension, where individual contact is direct, between the extension officer and the farmer on the spot. Whilst the vast majority of

visits are by request, the importance of sufficient staff and time to enable general liaison visits to be made must not be under-rated; this is *true extension* which invariably results in requests for further visits and an expansion of influence of the extension worker.

Office visits continue in a steady stream at most group offices, especially where these are in villages or towns; such visits are encouraged since much travelling, time and expense can be saved. In addition, photography and technical information is at hand and often some very valuable planning and extension with the farmer can be achieved.

Telephone calls are numerous, particularly from outlying areas.

Discussion groups and field days continue to be popular and well attended in purchase lands. Admittedly, these events also have a social function but they build up good relations between Government and farmers.

Notwithstanding the value of individual farm visits, acknowledged above, there is little doubt that group methods are excellent extension when properly planned and executed. Meticulous preparation is necessary, but when this is done success can be spectacular. Cattle discussion groups have been particularly successful; participating farmers took a keen interest in doing the calculations in connexion with the budgeting of various systems of beef and dairy production.

This kind of group-workshop technique is being used on an increasing scale and scope for the employment of this method is unlimited.

Another innovation was the testing of farmers' knowledge before and after discussion. This was surprisingly popular and the true effect of this technique is being investigated further.

For mass media, provinces generally indicate that these are still proving to be an excellent means of creating awareness. It is also apparent that the newsletter seems to be the most efficient of the media available. The number of newsletters published is increasing.

CROP PRODUCTION
FIELD CROPS

Tobacco

Flue-cured

Planting conditions were generally good. Some moisture stress was experienced in December, followed by wet conditions in January and February. This resulted in rapid ripening; considerable field losses of leaf occurred on some farms. Generally, good quality tobacco has been produced from the bottom half of the plant, but a tendency to produce "slaty" tobacco from the top in the slower growing areas is apparent. Overall it was a good quality crop. There is room for improvement in grading and presentation.

Burley

The tendency to earlier planting resulted in better crops in the land. A certain amount of curing trouble was experienced varying from too slow a cure in January to fast curing in February. Good styles of tobacco were produced but the quality from some areas was disappointing. The quality of field-cured tobacco was poor.

Cigar filler

Buyers and growers have been pleased with the result of the crop this season.

Maryland

The crop was a disappointment. On most farms this was the third tobacco crop and was treated accordingly. However, once packed and ready for despatch to the factory, some of the Maryland had good appearance.

Fire-cured

Again a disappointment; some growers did not handle the crop in a satisfactory manner.

Oriental

This crop was grown by two European farmers in Wedza and by African purchase land farmers mainly in the Victoria province. The wet season was unfavourable for growth and curing. Yields were low and quality was poor.

Insufficient Oriental has been produced this season to meet internal market requirements. Given improved organization and drive, sufficient could be produced for local needs.

Maize

The area planted has increased and further increases are expected in the coming year. Good planting rains and length of season favoured the variety SR52; yields in most areas were very high. The shorter season variety R200 has had mixed reception, and seems particularly prone to lodging; many farmers say they will not grow this variety again. However, since the long season favoured SR52 particularly and was unfavourable to R200, the latter should not be abandoned after a trial of only one season unsuited to the variety.

A survey of water planting indicated that, in future, much of the maize crop will be planted in this fashion.

A preliminary survey was undertaken into reasons for lodging. Results indicate that this was caused by insects, disease, wind and weak stalks, possibly the result of moisture stress in late November and December.

Sorghum

High guaranteed prices encouraged farmers to plant a substantial quantity of sorghum; some good yields were obtained. However, unless a high price is sustained it is unlikely that production will continue at this level.

Wheat

The crop is grown exclusively in winter in the lowveld and other parts of the country. Severe frost in the first week of August—when temperatures fell to minus 9°C—greatly reduced yields and much shrivelled grain was harvested. Some 55 per cent. of the crop in the lowveld was planted late as a result of wet conditions which delayed cotton harvesting. Average yields in other parts of the country were good, as much as 5 500 kg/ha.

An outbreak of leaf rust was reported from the Middle Sabi and Chiredzi ICAs, followed by some stem rust which appeared too late to cause any substantial loss.

Barley

This is grown, under contract to the maltsters, in Manicaland and the Umshandige area of Victoria where widespread frost damage occurred.

Rice

One commercial rice crop was grown in Chiredzi ICA. A field-scale planting in the lowveld in the summer of 1972 will be used to test methods to control Blast disease.

Groundnuts

Small areas of irrigated groundnuts were grown throughout the country. Some very high yields of about six tonnes per hectare were produced.

European farmers are showing increasing interest in this crop under irrigation. Larger areas are expected to be planted in the coming year.

Most dryland groundnuts are produced in African purchase lands where the long rainy season enabled above-average yields to be produced.

Soya-beans

Generally poor yields account for the declining area planted to this crop. It is, however, a good rotational crop and farmers are being encouraged to expand the area planted to soya-beans.

Edible beans and peas

Most edible-bean crops are grown on European farms for domestic consumption, although fair quantities are produced in African purchase lands.

March rains coincided with the germination of early planted peas and disease problems resulted; frost reduced yields by causing considerable damage to flowers and young pods during July.

Fusarium is becoming more widespread in pea crops.

Potatoes

Significantly large areas are planted to this crop near Salisbury, Bulawayo, Umtali and Marandellas. Yields of March plantings were substantially reduced by late blight and cold weather in June, leading to the potato shortage in September.

Cotton

Early rains in the main cotton-growing areas were heavy enough to ensure good germination in November, and crops got away to one of the earliest starts for many years. However, the season proved to be difficult in the lowveld where early rains upset irrigation schedules and caused conditions favourable for rank growth, particularly where nitrogen levels were high. In other parts of the country, a dry December helped encourage deep root development and weed control was simple.

Long periods of overcast cold weather in a very wet January helped produce rank growth in all cotton-growing areas other than the lowveld, but late rains in March and April ensured a good yield. Yields in excess of 3 000 kg/ha were achieved on dryland.

Red bollworm appeared early but only in very small numbers. American bollworm was persistent throughout the season, reaching its peak in January, but was adequately controlled. A prolonged and intense outbreak of Jassid in the lowveld caused some control difficulties in January. Wet conditions helped keep Spider mite numbers down; control did not present serious problems at any time during the season.

Xanthomonas (Black arm) was more prevalent than in previous seasons, probably the result of wet weather in January and early February. There were isolated reports of *Verticillium* wilt, and its incidence is increasing.

Sugar cane

Cane growth has been satisfactory, although some was retarded by limited sunshine during late January and February. No major diseases were reported. Smut continues to be the most serious disease; control is being achieved through the introduction of resistant varieties. Climatic and moisture irregularities during March and April caused cane to flower heavily during the 1972 winter, but this is not expected to seriously depress yields.

Sunflowers

The area planted to sunflowers remained almost unchanged. Fairly low average yields prevail.

Seed beans

Average yields of 2 000 kg/ha were reaped in the lowveld.

HORTICULTURAL CROPS

Deciduous fruit

Early ripening and strong vegetative growth characterized the season. The Christmas market was supplied with apples but at the expense of supplies for canning.

The early peach crop glutted the market, but canners were well supplied. Dessert plums were scarce following hail damage. Apricots were more plentiful than in the past.

Grape quality was not high; heavy rains fostered disease.

Local production of avocados and bananas met demand for most of the year, despite frost damage.

Citrus

Increased yields of this, the country's most important fruit crop, are still bringing realistic prices.

Other fruit crops

There is increasing interest in youngberries and raspberries, but strawberries disappointed last season.

Nut crops

Rust probably accounted for the poor almond crop. Interest in pecans persists, with increased plantings, as is also the case with macadamias. In the latter crop production of nuts was good but all seed was used for propagation.

Vegetables

The long, wet summer favoured the incidence of disease. As a result, acute shortages of onions, tomatoes and potatoes occurred.

The cold winter helped in making good yields of brassicas.

Marketing is of high standard in main centres and prices were generally firm.

Papain

Investigation is being followed into this product of papaws as an export crop.

Coffee

The number of farms continues to increase. Established plantations are yielding well, but to sustain production irrigation is essential. Mulching is being more generally practised to offset erosion, stress and die-back. New diseases have appeared. Correct pruning is a main management requirement calling for careful attention.

The crop has made its appearance in the African purchase lands and interest may increase when a central pulpery is established.

Tea

An expanding crop, producing better yields resulting from enlightened use of irrigation and new plantings from clonal material.

Pyrethrum

The appointment of a specialist, by the marketing company, has promoted interest. Price returns relate to pyrethrin content which has ranged widely from excellent to mediocre. Purchase land crops had poor pyrethrin content.

FODDER CROPS

Maize, sorghum and lucerne are the main fodder crops grown, particularly by dairy farmers. Yields of over 17 tonnes per hectare (dry matter) of lucerne are being obtained where management is correct.

OTHER CROPS

An interest has been shown in a new stringless mango cultivar. Plantings are being established in various localities.

The market was well supplied with fresh pineapples during the season and plantings will soon be sufficient to supply local canning demands. The quality of the fruit reaching the market has been very good and prices have remained high.

LIVESTOCK

Cattle—beef cattle

A late start to the rains delayed grass growth and prolonged the 1971 dry season. Heavy January rains followed with good late-season falls in most areas. The seasonal pattern had marked effects on cattle performance. Poor early season mass gains, followed by unfavourably wet conditions during part of the bulling season led to disappointing conception rates. On the other hand, better conditions late in the season resulted in good weaner performance. The 1972 winter has been shorter, but favourable conditions are reported to have led to a too drastic reduction of supplementary feeding by some farmers. Nevertheless, the practice of supplementary feeding is widespread, and this factor together with a good start

to grass growth in the 1972/73 season, promises well for high conception rates. The quality of supplements used has improved, and less reliance is placed on urea.

The trend away from weaner and young-stock production to a system of breeding and finishing has continued, together with an increase in summer veld fattening. Good results were generally obtained, but some failures were also recorded. The age at slaughter of veld-finished animals continued to decrease.

A movement out of breeding and into growing and finishing was in evidence in cropping areas. While both these trends may be consistent with maximizing profitability to the individual farmers involved, some concern must be expressed about the future availability of feeder stock to farmers in the cropping areas.

Several factors combined to completely change the economics of pen fattening. The beef: maize price ratio was favourably affected by the increased producer beef prices and the decreased maize price. In addition, the widespread use of high-urea, high-protein concentrates in fattening diets has significantly cut feeding costs. Consequently the demand for young stock and feeder cattle increased sharply.

The economic factors which favour pen fattening should continue, with an even greater demand for feeder cattle, provided the situation is not disturbed by drought. Such demand, together with the move away from feeder production mentioned above, could lead to a severe shortage of feeders.

While the increase in herd size continued in Mashonaland, the rate of increase declined; some properties are now showing evidence of overstocking. On the other hand, reduced stocking rates show good results where the dangers of overstocking have been realized.

Other beef production problems included sporadic occurrence of disease, veld fires and specific problems associated with high-energy feeding. Probably the biggest problems are poor management of veld and animals and failure to keep records. Absentee landlords in Matabeleland contribute largely to this problem, but many cattle farmers fall short in one or more respects. In contrast, well-managed properties which employ good physical and financial recording systems continue to show excellent production and profit.

Beef cattle in purchase lands

Slow improvement of management continues, although the general standard remains very low. Fattening of cattle shows marked improvement however; Victoria, as usual, fattening by far the greatest number. A significant trend is the increase in the proportion of chiller grades achieved.

Beef Performance Testing Scheme

The introduction, last year, of new mass (weight) return sheets, calls for a new factor to measure the growth of the scheme; this is the number of calves born in any calf-year (March to February), and recorded under the scheme:

1967/68	8 000
1968/69	11 500
1969/70	13 300
1970/71	17 900

This expansion strained both staff and computer facilities and consequently some delay was occasioned in the return of processed records. As a result it was necessary to close membership of the scheme and refuse new applications. When promised new computer facilities are operating it is intended to re-open membership.

The new mass sheets also necessitated new analysis procedure for post-weaning data. The farmer now receives a Yearling Performance Report booklet in which the recorded data has been computer processed. Over 5 000 post-weaning records were analyzed in this way.

Bull Approval Scheme

The scheme continues to rely on only the Hereford and Sussex breeds for support. Fewer bulls were approved this year, probably the result of the declining bull market in recent years. The whole concept of the scheme will need revision if it is to realize its potential.

The average bull buyer rarely makes reference to performance when buying. Until this situation changes, breeders will see little advantage in providing performance statistics. However, some evidence of change is apparent in that a small but increasing number of buyers make use of performance information, without necessarily involving the official Bull Approval Scheme.

Dairy production

The season was generally good for fodder and grain-crop production; in consequence, feed supplies were better than usual. It appears that most dairying areas have real need for extension, particularly in aspects of general management, fodder flow and efficiency.

There is an urgent need for a dairy specialist in the Department, to service the highly specialized modern dairy industry.

SHEEP

The Rhodesian sheep population may have experienced slight reductions during the past year, but the industry is now showing signs of stabilizing itself and even of expanding a little.

Demand for better grades of mutton and lamb still exceeds supply by a considerable margin,

particularly in the major consuming areas. However, the new price structure recently announced should do much to improve returns to producers in all parts of the country, particularly following recent CSC moves to compete with private butchers for suitable mutton and lamb.

A trend on the production side, appears to be towards fewer, but bigger producers. Presumably, where sheep provide a sufficiently large part of whole farm income, farmers have more time and incentive to attend to important details of management.

The excellent results obtained from pen fattening weaned lambs at Grasslands are bound to have a significant impact on sheep-production patterns, particularly in cropping areas. Attention is likely to focus on ewe management and weaning percentage to an increasing degree, and the finishing of lambs in feed pens. Such a change should increase productivity as a whole and, in particular, increase the number of lambs graded "super".

Although not expanding, production from dual-purpose sheep is progressing well in Mashonaland South and Manicaland. In addition to weaving industries on farms, wool marketing has improved through co-operation between this department and the Ministry of Internal Affairs which appears to have established a satisfactory marketing arrangement between producers and the Zuwa Weaving Centre at Inyanga.

A start has been made in producing a Sheep Management Handbook. Publication and distribution will be done in conjunction with the Livestock Department of the RNFU.

PIGS

Successful production is predominantly centred on large efficient enterprises. A few small-quota producers operate near towns and in the purchase lands, but levels of management and production are generally low in these cases. A development of interest in Manicaland is the swing away from the almost traditional inclusion *butu* (grain dregs from beer brewing) as a major constituent of the ration. Mainly, this change was made because of the digestive disturbances associated with this feed.

FISH

Most farm dams are stocked but seldom properly managed or harvested; the result is that much potential production is lost. Some netting of farm dams for labour rations has been initiated at Mtoko.

The potential value of angling has yet to be realized as a tourist attraction, although the scene has been set by the Inyanga and Vumba trout schemes. In Cashel a survey of local streams is to be made with a view to establishing angling facilities for tourists. From Kyle it is reported that, from the point of view of expenditure by tourists, fish are worth $20 per kilogram!

RABBITS

Production has not increased owing to problems of marketing. Most interest stems from Young Farmers' Clubs.

LIVESTOCK IMPROVEMENT COMMITTEE

We record, with deep regret, the death at Salisbury on the 3rd August 1972, of Mr. A. L. Millar, O.B.E., a founder member of the Committee on which he served for 34 years.

In consequence of decisions taken by the Minister in March 1972, LIC has ceased to be involved with exports of breeding stock, other than registered animals.

The *List of Breeding Stock Available*, published by the Committee twice yearly from information obtained from breeders, is reported to be playing an important part in the export drive.

CONCLUSION

The excellence of the season gave a fillip to agricultural production. This should have cheered farmers; but when that same production was set against modest prices that prevailed there was little cause for satisfaction.

Veld condition, about which there had been disquieting reports the previous year — particularly from the south of the country — showed marked improvement. Grazing in Matabeleland recovered remarkably, as did the morale of ranchers who, nonetheless, felt that beef was out of favour as far as remuneration for agricultural production was concerned. In view of the substantial subsidies provided for maize and tobacco growers, cattle farmers, rightly or wrongly, believed their industry was unjustly denied similar support. They are quite certain that returns on any beef-cattle enterprise will undoubtedly be low if management is anything less than excellent.

It is unfortunate to note that conservation has had to resort to the legal strength of the Natural Resources Act, rather than rely on the neighbourly influences of the Intensive Conservation Area committees. Regrettably, a number of orders have been placed upon farmers in terms of Section 47 of the Act. Need it be said that this kind of action is recommended only with the greatest reluctance after all other approaches have failed.

Some ICA committees are hard put to carry out their function through lack of local support for the principle which the committees represent.

The usefulness of the committees in the cause of conservation is undeniable; local representation and responsibility for local problems is an essential concept of practical conservation. Without district involvement, conservation will be in danger of becoming impersonal, negative and probably sterile. Without neighbourhood and local responsibility for conservation, this country's resources will be no more secure than those of the rest of the world — to which we have set an example of high responsibility in conservation matters for more than fifty years.

Relationships between staff and farmers have been good. Farmers are rightly impatient with impractical theory, however well intended. The farming environment of the past six years has been overclouded by the effects of sanctions and characterized by drought, high costs and low prices. It is therefore not only gratuitous but inappropriate to classify farmers as *below average* or *not up to standard*, which presumptuous judgements are, unfortunately, sometimes made. Today's farmer is a survivor, needing basic, practical information, without theoretical wrapping. This is the kind of help Conex aims to give and we believe it has been received with appreciation.

Extension is, however, uphill work if the farming community has little enthusiasm. Staff have found their work hard going. Reputations are not made via the unglamorous tasks associated with the provision of routine services for farmers: pegging conservation works, veld and farm planning and handling day-to-day requests for information. These tasks take up much working time and yet the best we can say is that the year is one of unspectacular achievement in dealing with these jobs.

Extension programme planning has helped to give objectivity to the work of the Department. The effectiveness of individual plans is related to the involvement of the farming community in making and implementing their local plan. Good plans are synonymous with a high degree of farmer involvement.

An improvement in the link between extension and research has been noticeable; officers in both disciplines are alert to the need to keep in the closest touch to ensure a practical communication chain with farming.

It is remarkable that in this essentially agricultural country many important administrative and executive officers have no understanding of the extension role.

Some salary anomalies are the cause of irritation among professional officers of the Department. The proposed re-organization of the Department will go a long way towards the removal of these discriminations and the establishment of an equitable salary situation.

As in previous years the Department has worked closely with the Natural Resources Board and its various committees, and with the Rhodesia National Farmers' Union, its commodity associations and subsidiary groups. The willing collaboration and assistance we have had from all these is acknowledged with gratitude.

To those ministries, departments, statutory boards and other agencies with whom this department has been associated during the year, I extend sincere thanks for the wholehearted co-operation they have given in matters of mutual interest.

Finally I wish to record my appreciation to all Conex staff, field, specialist and administrative, particularly for their loyal devotion to duty and dedication to the work of the Department. Often these men work in trying circumstances and are subjected to heavy pressures of work and occasionally, and very unfairly, to unreasoned and unjust criticism.

The part each plays in the Department's team is essential to its total function and I am grateful for the unstinting support I have received from the entire staff.

J. H. H. LOUWRENS,
Director
Department of Conservation and Extension

Visits to other countries

Name	*Purpose*	*Place*
Allison, A. G.	Tea irrigation	Malawi
Bembridge, T. J.	University of Reading	U.K.
Brown, J. C.	Land-use planning advisory visit—Kasunga Tobacco Estate	Malawi
Burgess, M. W.	Ultra low-volume techniques (cotton spraying)	Mocambique
Burgess, M. W.	Cotton growing areas	U.S.A.
Davies, T. S.	Tea irrigation	Malawi
Donkin, D. J.	South African Society of Animal Production Congress	R.S.A.
du Toit, F. P.	Work and operations of farm-building engineers	R.S.A.
Elwell, H. A.	Advise on conservation in tobacco	Malawi
Gammon, D. M.	O.F.S. University—post-graduate study	R.S.A.
Hill, J. R. C.	Revegetation of mine dumps	Botswana
Hughes, Dr. A. J. B.	Sociology Conference	R.S.A.
Ivy, P.	S.A.R.C.C.U.S. land-use planning sub-committee meeting	Malawi
Kille, T.	Special duties	Malawi
Locke, R. F.	Ultra low-volume techniques (cotton spraying)	Mocambique
Oliver, G. J.	Conduct two courses on contour layouts	Angola
Papadopoulo, Miss P.	Fourth Annual Symposium of South African Beekeepers	R.S.A.
Robertson, W. R.	Tenth Annual Conference of Agricultural Economics Society	R.S.A.
Robinson, J. C.	Conduct two courses on contour layouts	Angola
Schmolke, M. D.	Fourth Annual Symposium of South African Beekeepers	R.S.A.
Spear, A. J.	S.A.R.C.C.U.S. meeting	Malawi
Stubbs, A. T.	South African Society of Animal Production Congress	R.S.A.
Taylor, R. D.	Visit with farmers to eastern Transvaal	R.S.A.
Tornbohm, R.	S.A.R.C.C.U.S.	R.S.A.
Vaughan-Evans, R.	Free-choice mineral feeding	R.S.A.
Walker, M. J.	N.I.A.E. at Silsoe—observe grain-drying machinery and ox-drawn implements	U.K.
Walker, M. J.	Plant breeding institute at Cambridge	U.K.
White-Spunner, D.	Study tour—Youth Extension and extension methods	U.K. and Holland

Publications

Author	*Title*	*Publication*
Archibald, R. I. M.	Weeds: a problem in Rhodesian wheat crops	*Modern Farming*
Archibald, R. I. M.	A guide to the irrigation of cotton in the lowveld	*Rhodesian Farmer*
Archibald, R. I. M.	Labour shortage seriously delays harvesting of the lowveld cotton crop	*Rhodesian Farmer*
Archibald, R. I. M.	Short winter restricts planting dates and limits yield of lowveld wheat crops	*Rhodesian Farmer*
Archibald, R. I. M.	Cotton research in the lowveld	*Cotton Boll*
Archibald, R. I. M.	Some problems of mechanically harvested cotton in the 1971/72 season	*Cotton Boll*
Ball, J. S.	Design and construction of screeded concrete irrigation furrows	Irrigation Handbook
Ball, J. S. and Pugh, O.	Practical bilharzia control	Irrigation Handbook
Ball, J. S. and van Ryneveld, J. A.	Development of water supplies from sand river beds	*Rhodesia Agricultural Journal*
Barclay-Smith, R. W.	The four pillars of Rhodesian tobacco Part I	*Tobacco Forum*
Barclay-Smith, R. W.	The four pillars of Rhodesian tobacco Part II	*Tobacco Forum*
Barclay-Smith, R. W.	Factors affecting the production of quality flue-cured tobacco	*Tobacco Forum*
Barclay-Smith, R. W.	The problems of sponge and slate (with J. L. Stocks)	*Tobacco Forum*
Barclay-Smith, R. W.	Sherlock Holmes takes a look at tobacco	*Rhodesian Tobacco Journal*
Barclay-Smith, R. W.	Metricated man plants tobacco	*Rhodesian Farmer*
Batty, M. R.	Asparagus	Horticultural Handbook
Beaumont, C.	Agricultural leadership	*Rhodesia Agricultural Journal*
Braithwaite, P. G.	Conex units pioneer a road	Departmental
Brown, J. C.	Some observations on the lodging of maize in the 1971/72 season	*Rhodesian Farmer*
Brown, J. C.	Maize herbicides	Marandellas Newsletter
Brown, J. C.	What variety do I plant next season	*Rhodesian Farmer*
Brown, J. C.	Soaking maize seed	*Rhodesian Farmer*
Buchanan, G. F.	Irrigation of peas	*Rhodesia Agricultural Journal*
Buchanan, G. F.	Irrigation of tomatoes	*Rhodesia Agricultural Journal*
Buchanan, G. F.	A brief look at apple rootstocks and tree form in England	Hortus
Burgess, M. W.	Over-all improvements in cotton due to breeding	*Cotton Boll*
Burgess, M. W.	Scouting is essential	*Cotton Boll*
Burgess, M. W.	Reaping survey	*Cotton Boll*
Burgess, M. W.	Practical research results 1971/72	*Cotton Boll*
Burgess, M. W.	Cotton plant spacing	*Rhodesian Farmer*
Carew, G. W.	Feeding cows on silage all the year round	*Stock and Crops*
Carew, G. W.	Will it now pay to intensify beef production?	*Farmers' Co-op Newsletter*
Collett, W. E.	Gross margins and hidden profits in soya-bean production	*Rhodesian Farmer*
Collett, W. E.	Crops yield well in oilseeds competition	*Rhodesian Farmer*
Collett, W. E.	Irrigated groundnuts—what future?	*Rhodesian Farmer*
Collett, W. E.	Irrigated groundnut recommendations	*Rhodesian Farmer*
Collett, W. E.	Groundnut production in tribal areas	Departmental
Cormack, D. B.	Irrigation of deciduous fruit trees	*Rhodesia Agricultural Journal*
Cormack, D. B.	Macadamias	Departmental
Davies, T. S.	Irrigation of groundnuts	Irrigation Handbook
Davey, C. J. N.	Vlei drainage and utilization	*Rhodesia Agricultural Journal*
de Jong, J.	Work study implications of water planting	*Rhodesia Agricultural Journal*
de Jong, J.	Work study in Rhodesian tobacco production	*Tobacco Forum*
de Jong, J.	A review of tobacco grading methods used during the 1971/72 season	*Modern Farming*
de Jong, J.	Management aspects of cotton harvesting	*Cotton Boll*
de Jong, J.	Wage policy and labour productivity	*Rhodesian Farmer*
de Jong, J.	Planning and control in farming	*Rhodesian Farmer*
de Jong, J.	Details of maize harvesting methods and costs	*Rhodesian Farmer*
de Jong, J.	Observations on fruit spraying	*Rhodesian Farmer*
de Jong, J.	Labour input standards for selected crops	Departmental
de Jong, J.	Tractor and labour planning	R.N.F.U. seminar
de Jong, J.	Wages and productivity	R.N.F.U. seminar
Donkin, D. J.	Pen finishing of lambs	*Modern Farming*
Donkin, D. J.	Sussex Society introduces class for beef-recorded bulls at Salisbury	*Modern Farming*
Donkin, D. J.	Pen fattening of lambs	*Modern Farming*
Donkin, D. J.	New beef prices	*Stock and Crops*
Donkin, D. J.	Dipping and dip disposal: the pollution danger	*Rhodesian Farmer*
Donkin, D. J.	Ram lambs—the pros and cons	*Rhodesian Farmer*
Donkin, D. J.	Show preparation of cattle	*Rhodesian Farmer*
Donkin, D. J.	Show preparation of sheep	*Rhodesian Farmer*
Donkin, D. J.	Rearing dairy calves: the Johnson method	*Rhodesian Farmers' Diary*
Donkin, D. J.	Pratt cattle bail	Departmental
Donkin, D. J.	Sheep prices	Departmental
Donkin, D. J.	Wool and wool processing	Departmental
Donkin, D. J.	1972 beef slaughter prices	Departmental
Donkin, D. J.	Feeds and feeding in purchase lands	Departmentel
Donkin, D. J.	High urea concentrates for pen feeding	Departmental
Donkin, D. J.	Supplementary feeding in purchase lands	Departmental

Author	*Title*	*Publication*
Donkin, D. J.	Cattle fattening in purchase lands	Departmental
Donkin, D. J.	New sheep prices and grades	Departmental
Donkin, D. J.	Anthelmintics for sheep	Departmental
Donkin, D. J.	Long v. chopped hay	Departmental
Donkin, D. J.	Veld management studies	Departmental
Donkin, D. J.	Beef management (transcript from radio broadcast)	R.N.F.U.
du Toit, F. P.	Labour Housing	*Modern Farming*
du Toit, F. P.	Timber as a tobacco curing fuel	Wankie Colliery Co.—Symposium tobacco curing
du Toit, F. P.	Metrication in farm structures, *Technical Bulletin No. 14*	Metrication Council of Rhodesia
Elwell, H. A.	The influence of agricultural systems on rainfall runoff	*Rhodesia Agricultural Journal*
Elwell, H. A.	Requirements of a modern soil-conservation system	*Rhodesia Agricultural Journal*
Elwell, H. A.	Artificial waterways—concepts and misconceptions	*Rhodesian Farmer*
Elwell, H.A. and Davey, C. J. N.	Vlei cropping and the soil and water resources	*Rhodesia Agricultural Journal*
Gallagher, R. J.	R200 maize trials at Zowa	*Kunzwa/Ukuzwa*
Gammon, D. M.	Performance testing	Tuli Annual
Gammon, D. M.	Tuli grazing trial (co-author)	Departmental
Gammon, D. M.	Increasing productivity of the beef cow	Departmental
Gammon, D. M.	Metricating livestock units and stocking rates	Departmental
Gammon, D. M.	Beef production—policy for Matabeleland	Departmental
Going, W. D.	The pawpaw in Rhodesia	*Rhodesia Agricultural Journal*
Going, W. D.	Pineapple production in Rhodesia	*Stock and Crops*
Going, W. D.	Vegetable rotations for the backyard gardener	*Rhodesian Farmers' Diary*
Going, W. D.	Gardening this month	*The Record*
Hannington, R. J. C.	Mazoe Valley agricultural survey	Departmental
Hayward, J. W.	Function and duties of Husbandry Branch	*Tobacco Forum*
Hill, J. R. C.	The mine-dump problem in Rhodesia	*Rhodesia Agricultural Journal*
Hope, R. J. C.	Proud winner of $100 prize	*African Times*
Howden, R. H. G.	Potatoes	*Rhodesia Agricultural Journal*
Howden, R. H. G.	Potato growing in Rhodesia	*Stock and Crops*
Howden, R. H. G.	Farming calendar	*Stock and Crops*
Howden, R. H. G.	Sorghum	*Stock and Crops*
Howden, R. H. G.	What variety shall I plant next season	*Rhodesian Farmer*
Howden, R. H. G.	How maize competition winners grew their crops	*Rhodesian Farmer*
Howden, R. H. G.	Sunflowers	*Rhodesian Farmers' Diary*
Howden, R. H. G.	Methods of adapting the season to suit maize	*Farmers' Co-op News*
Howden, R. H. G.	Harvesting (maize)	R.N.F.U.
Howden, R. H. G.	Liaison: Conex and the Rhodesia Seed Potato Association	Departmental
Humphrey, K. and Boyd-Clark, M.	Veld day with a difference	*Rhodesian Farmer*
Jones, M. E.	Land levelling	*Rhodesia Agricultural Journal*
Jones, M. E.	Wheel slip is greatest loss of power	*Modern Farming*
Jones, M. E.	Cut soya-bean harvest losses	*Stock and Crops*
Jones, M. E.	Setting a mounted disc plough	Ploughing Association of Rhodesia
Jones, M. E.	Competition ploughing: Advisory notes	Ploughing Association of Rhodesia
Kennan, P. B.	Influence of the McIlwaine Report on natural resources on development of European agriculture in Rhodesia	*Rhodesia Agricultural Journal*
Kennan, P. B.	Water, the key to prosperity	*Modern Farming*
Kennan, P. B.	Is there enough personal contact between agricultural extension and research workers in Rhodesia?	Departmental
Kille, T.	The Rhodesian tobacco grower 1965/72	*Tobacco Forum*
Kille, T.	Management factors influencing yield	*Tobacco Forum*
Kille, T.	Tobacco grading and presentation	*Modern Farming*
Kille, T.	Burley grading	*Modern Farming*
Kille, T.	Tobacco production	*Modern Farming*
Kille, T.	Frank Lilford—an appreciation	*Stock and Crops*
Locke, R. F.	Factors affecting cotton yields in Rhodesia	*Stock and Crops*
Locke, R. F.	Observations on the 1971/72 cotton crop in Manicaland and parts of Mashonaland North and South	*Rhodesian Farmer*
Locke, R. F.	Short summary of cotton production in Rhodesia	Ministry of Agriculture
Locke, R. F.	Notes on cotton for Extension Assistants	Departmental
Meikle, G. J.	Research notes: tillage	*Rhodesia Agricultural Journal*
Meikle, G. J.	Tillage for soil and moisture conservation	*Stock and Crops*
McClymont, D. J.	Topping and suckering: why and when	*Rhodesian Tobacco Journal*
McClymont, D. J.	There is no conjury in curing	*Rhodesian Tobacco Journal*
McClymont, D. J.	Getting your grading off the ground	*Rhodesian Tobacco Journal*
McClymont, D. J.	Tobacco grading: trouble-shooting chart	*Rhodesian Tobacco Journal*
McClymont, D. J.	What we've been waiting for—the season's start	*Rhodesian Tobacco Journal*
McClymont, D. J.	Watch out for white mould	*Rhodesian Tobacco Journal*
McClymont, D. J.	Final phase of burley production	*Rhodesian Tobacco Journal*
McClymont, D. J.	Make reaping easier	*Stock and Crops*
McGregor, A. H.	Development of water supplies	Departmental
Naude, J. F.	How to select a Dorper	*Stock and Crops*
Naude, J. F.	Cattle fattening	*Rhodesian Farmer*

Author	*Title*	*Publication*
Naude, J. F.	Lamb fattening	*Rhodesia Herald Show Supplement*
Naude, J. F.	Cattle management	*Marandellas Management Advisory Service Handbook*
Naude, J. F.	Cattle fattening	Marandellas Newsletter
Norton, J. D.	Summer fattening on veld and pasture	*Modern Farming*
Norton, J. D.	Research results	Advisory Notes
Norval, F. A.	Field day at Balla Balla	*Rhodesian Farmer*
Oliver, G. J.	Plough setting	*Stock and Crops*
Oliver, G. J.	Practical method of reducing tractor-maintenance costs	*Cotton Boll*
Oliver, G. J.	Farm machinery training for farmers	Ploughing Association of Rhodesia
Oliver, G. J.	Maintenance of tractors	*Barlow's Circle*
Palmer, C. H.	Tobacco notes	*Rhodesian Farmers' Diary*
Papadopoulo, Miss P.	Bees	*Rhodesia Agricultural Journal*
Papadopoulo, Miss P.	Attempts in queen-mating in confinement	*Bee World*
Papadopoulo, Miss P.	Bundu Book No. 5	*Bundu Book*
Papadopoulo, Miss P.	Bees	*Rhodesian Farmers' Diary*
Papadopoulo, Miss P.	Creamed honey	*Bee Line*
Papadopoulo, Miss P.	Summary of honey uses	*Bee Line*
Papadopoulo, Miss P.	Notes on melliferous plants	*Bee Line*
Papadopoulo, Miss P.	New method to harvest a swarm	*Bee Line*
Papadopoulo, Miss P.	Bees for health	*Bee Line*
Papadopoulo, Miss P.	Health and honey	*Bee Line*
Papadopoulo, Miss P.	Bees for sideliners	*Shamva Cuttings*
Papadopoulo, Miss P.	Some tips for beginner beekeepers	*Shamva Cuttings*
Papadopoulo, Miss P.	Honey	*Shamva Cuttings*
	Honey and its uses	*Shamva Cuttings*
Papadopoulo, Miss P.	Apiculture Bulletin No. 5	Departmental
Papadopoulo, Miss P.	Apiculture Bulletin No. 6	Departmental
Papadopoulo, Miss P.	Apiculture Bulletin No. 7	Departmental
Papadopoulo, Miss P.	Assembling frames	Departmental
Papadopoulo, Miss P.	Correct spacing	Departmental
Papadopoulo, Miss P.	Bulletin on beekeeping	Departmental
Parker, H. H.	Land clearing and stumping	Departmental
Pigott, J. C.	Veld management notes	Departmental
Pilditch, A. G.	Sprinkler irrigation design	Irrigation Handbook
Robertson, W. R.	Costs and benefits of irrigation for certain crops	*Rhodesia Agricultural Journal*
Robertson, W. R.	Seasonal limitations to crop production	*Rhodesia Agricultural Journal*
Robertson, W. R.	Rainfall and maize production	*Rhodesian Farmer*
Roblin, A. J.	Yearling mass: an important selection criterion	*Stock and Crops*
Roblin, A. J.	Rhodesia Beef Performance Testing Scheme	*Livestock Index*
Roblin, A. J.	Selecting the herd bull	*Livestock Index*
Rumsey, G.	History of the Livestock Improvement Committee	*Stock and Crops*
Schmolke, M. D.	Attempts to obtain mating of honey bees in confinement	*Rhodesia Agricultural Journal*
Schmolke, M. D.	Honey production in Rhodesia	*Rhodesia Herald*
Schmolke, M. D.	Beekeeping in Rhodesia	*Gwelo Times*
Schmolke, M. D.	Swarming control	*Bee Line*
Schmolke, M. D.	Allergy	*Bee Line*
Schmolke, M. D.	Honey production in Rhodesia	*Bee Line*
Spear, A. J.	An Agricultural Engineering Centre—is one really necessary?	*Tobacco Forum*
Spear, A. J.	Management of tractors and machinery (*paper presented at R.N.F.U. seminar*)	*Rhodesian Farmer*
Thompson, C. K.	Russian geography: a geographical survey	*Rhodesia Agricultural Journal*
Tornbohm, R.	Resource education and the public	*Rhodesia Agrictulrual Journal*
Tornbohm, R.	Extension: the communication link between agricultural research and farm practice	*Rhodesia Agricultural Journal*
Tornbohm, R.	Editorial	*Tobacco Forum*
Touber, A.	Notes on cattle-handling facilities	Departmental
Walker, M. J.	S.C.A.M. abridged test reports (3)	*Modern Farming*
Walker, M. J.	To dry—or not to dry	*Rhodesian Farmer*
Watermeyer, J. M.	Use of sewage effluent for irrigation	*Rhodesia Agricultural Journal*
Watermeyer, J. M.	A practical approach to irrigation scheduling on Rhodesian farm schemes	*Rhodesia Agricultural Journal*
Watermeyer, J. M.	Planning a farm irrigation scheme	Irrigation Handbook
Watermeyer, J. M.	Water pollution in agriculture	*Rhodesian Farmer*
Watermeyer, J. M.	Crop water requirements	*Rhodesian Farmers' Diary*
Welland, P. M.	The labour shortage in agriculture	*Rhodesia Agricultural Journal*
Welland, P. M.	Maximizing net profit by simplified programming	*Modern Farming*
Welland, P. M.	Shall I put my maize through beef?	*Stock and Crops*
Welland, P. M.	Maize silage	*Stock and Crops*
Welland, P. M.	Farm planning—the target approach	*Rhodesian Farmer*
Wilson, G. J.	Gated pipe irrigation	*Rhodesia Agricultural Journal*
Wilson, G. J.	The effect of water stress on certain field crops	*Rhodesia Agricultural Journal*
Wilson, G. J.	The price of efficient irrigation	*Stock and Crops*
Young, J.	Cotton yield variations—who is responsible?	*Rhodesian Farmer*

Radio and television

Braithwaite, P. G.	Conservation working account	10 minutes
Chiyoka, P.	Nhau dzevarimi, 27 × 30 minutes	810 minutes
Donkin, D. J.	Beef cattle management	10 minutes
do Toit, F. P. R.	Pollution of dip tanks	15 minutes
du Toit, F. P. R.	The work of an architect in Agriculture—S.A.B.C.	15 minutes English 15 minutes Afrikaans
Elwell, H. A.	Conservation working account	10 minutes
Hill, J. R. C.	Veld management	10 minutes
Hill, J. R. C.	Farm management planning	10 minutes
Kille, T.	Overseas tour series (*three presentations of four minutes*)	12 minutes
	Topical tobacco subjects (*two presentations of four minutes*)	8 minutes
Lamprecht, C. W.	Conservation working account	10 minutes
Parker, H. H.	Conservation working account	10 minutes
Spear, A. J.	The Agricultural Engineering Centre	8 minutes
Stubbs, A. T.	Beef symposium	8 minutes
Stubbs, A. T.	Green revolution	20 minutes
Tornbohm, R.	Conservation (S.A.R.C.C.U.S.)	15 minutes
Tornbohm, R.	Conservation (S.A.R.C.C.U.S.) (RTV)	15 minutes
Zishiri, J.	Nhau dzevarimi, 25 × 20 minutes	500 minutes

Imports—1st October, 1971 to 30th September, 1972

CATTLE

Breed	Bulls	Females	Calves	Total 1971/72	Total last year
Aberdeen Angus	1	—	—	1	14
Africander	10	27	—	37	60
Ayrshire	—	15	—	15	Nil
Brahman	8	34	4	46	63
Bonsmara	5	8	—	13	Nil
Charolais	5	4	—	9	40
Dexter	—	—	—	Nil	4
Drakensberger	—	10	—	10	Nil
Friesland	3	69	3	75	15
Hereford	10	33	1	44	16
Jersey	—	40	—	40	26
Pinzgauer	—	—	—	Nil	6
Santa Gertrudis	1	—	—	1	16
Shorthorn	4	3	—	7	10
Simmentaler	12	87	13	112	184
South Devon	—	—	—	Nil	2
Sussex	6	—	—	6	9
Totals	65	330	21	416	465

SMALLSTOCK

Sheep	Rams	Ewes	Total 1971/72	Total last year
Black Head Persian	—	—	Nil	14
Bezuidenhout	5	—	5	Nil
Dorper	5	30	35	9
German Merino	5	5	10	53
Suffolk	4	15	19	6
Van Rooy	—	—	Nil	3
Totals	19	50	69	85

Boer Goats	4	—	4	Nil

Pigs	Boars	Gilts	Total last year	Total 1971/72
Landrace	7	9	16	4
Large White	5	10	15	10
Totals	12	19	31	14

APPENDIX IIIB

Exports—1st October, 1971 to 30th September, 1972

Breed	Registered		Grade		Total 1971/72	Total last year
	M	F	M	F		
Aberdeen Angus	4	10	—	—	14	8
Africander	45	—	33	860	938	1 367
Ayrshire	1	—	—	—	1	Nil
Brahman	13	—	138	431	582	1 177
Charolais	2	—	—	—	2	54
Friesland	5	—	2	36	43	125
Hereford	2	12	4	413	431	333
Jersey	—	—	—	—	Nil	21
Nkone	—	—	—	—	Nil	4
Santa Gertrudis	2	—	—	—	2	15
Shona	—	—	—	—	Nil	56
Simmentaler	3	—	18	18	39	Nil
Sussex	9	3	37	452	501	111
Tuli	9	—	—	—	9	9
Totals	95	25	232	2 210	2 562	3 280

Note.—Figures for *Grade* cattle extend to March, 1972, when control of exports of this type was removed from the L.I.C.

APPENDIX IVA

Training

Courses run at Salisbury and Domboshawa Training Institute

	No. of courses	Trainee/ training days	Participants	
			Conex	Others
Salisbury:				
(*a*) Conex	18	959	205	17
(*b*) Internal affairs	10	1 034	—	196
(*c*) R. & S.S.	3	108	—	36
Domboshawa*	42	4 383	424	486
Totals	73	6 484	629	735

* Including courses held at provinces.

APPENDIX IVB

Training

Courses organized at district and provincial level

Province	No. of courses	Attendance	
		Conex	Others
Manicaland	52	127	531
Mashonaland North	23	291	—
Mashonaland South	9	192	47
Matabeleland	8	12	357
Midlands	23	238	15
Victoria	30	186	—
Totals	145	1 046	950

APPENDIX V

Soil conservation

Province	Contour ridges and storm drains			Waterways pegged (km)	Roads pegged (km)
	Pegged (km)	Constructed (estimated) (km)	Area protected (ha)		
Manicaland	1 033,1	1 080,5	3 541,9	18,9	44,9
Mashonaland North	6 948,2	6 873,9	26 743,0	227,6	184,2
Mashonaland South	1 755,5	1 603,3	8 396,0	64,7	43,3
Matabeleland	822,7	467,2	3 365,0	0,4	Nil
Midlands	502,6	304,0	1 796,4	70,3	43,8
Victoria	439,4	284,3	1 041,0	Nil	Nil
Totals	11 501,50	10 613,20	44 883,30	381,9	316,2

APPENDIX VI

Water conservation

Province	No. of dams and weirs constructed under Conex supervision	Capacity (10^3m^3)	
		Total	Average
Manicaland (Query)	44	946,100	21,5
Mashonaland North	73	3 103,400	43,700
Mashonaland South	13	579,38	44,57
Matabeleland	26	1 499,700	57,600
Midlands	24	607,995	25,100
Victoria	12	50,022	4,175
Totals	192	6 786,597	35,10

APPENDIX VII

Dams constructed under Conex supervision

Province	Farmers and contractors				Government unit earth dams	
	Earth dams		Weirs			
	No.	%	No.	%	No.	%
Manicaland	34	75,5	1	3	9	21,5
Mashonaland North	47	64	3	4	23	32
Mashonaland South	6	46,15	1	7,70	6	46,15
Matabeleland	18	70	4	15	4	15
Midlands	12	50	2	8	10	42
Victoria	6	50	1	8	5	42
Totals	123	62,5	12	5,5	57	32,0

Record of general extension work: purchase lands

Province	Manica-land	Mashona-land North	Mashona-land South	Matabele-land	Midlands	Victoria	Total
Number of:							
Master farmers	839	1 365	4 287	122	869	1 256	8 738
Master farmers qualifying during the year	—	16	37	—	—	—	53
Master farmers in training	19	81	114	28	—	52	294
Co-operative farmers	1 341	814	899	575	959	1 515	6 103
Farm carts in use	1 105	1 571	1 237	703	1 160	1 605	7 381
Farmers using fertilizers	752	659	1 138	119	684	609	3 961
Farmer days	239	206	115	20	30	201	811
Farmers attending field days	5 911	8 718	6 881	787	2 460	10 851	35 608
Agricultural shows	11	6	4	1	4	4	30
Training centres in use	10	8	7	1	—	13	39
Training centres constructed during the year	—	1	1	—	—	—	2
Tractors	71	232	44	26	29	21	423

APPENDIX IX

MEETINGS ATTENDED BY CONEX STAFF

African Farmers Liaison Committee with the Ministry (Director)
African Purchase Land local and group conferences (EOs & GOs)
Agricultural Finance Corporation (PC & EOs)
Agricultural Land Settlement (PC & EOs/GC & EOs)
Agricultural Research Council. Research Policy Committee (SAHS)
Alvord Institute Training conferences (PC & EO)
Association of Scientific Societies of Rhodesia (SAHS)

Beef Performance Testing Scheme Re-organization (SAHS)
Bulawayo Agricultural Society (APC & EO)

Cane Planters' Association (PC & EO)
Central African Standards' Association Technical Committees (CE)
Chibero College Council (Assistant Director (Field))
Chipinga Coffee Experiment Station Liaison Committee (PC & EO)
Commerce and Industry—Exports (SAHS)
Committee on Co-ordination of Cloud Seeding Experiment (Assistant Director (Technical))
Conex Working Party on Handling Facilities (A & PS)
Conservation Education Committee (GC & EO)
Cotton Growers' Association. Sub-committees (Cotton Specialists)
Cotton Research Policy Committee (CHO)
Crop Forecasting Committee of Controlled Products (Sen. Agronomist)
Crop Research Sub-committee of ARC (CHO)
Crop Variety Committee (Sen. Agronomist, CHO)

Darwendale Dam Liaison Committee
Deciduous Fruit Growers' Association (Horticulturist, Rusape)
Departmental Re-organization—Working Party (SAHS, Sen. Agronomist)
Devuli Ranch Board of Directors (A & PS)
Drought Relief Committee (PC & EO)

Executive Committee of the Rhodesia Beekeepers' Council (Sen. Apic.)
Executive Committee of the Mashonaland Beekeepers' Association (Sen. Apic.)

Farmers' Association (A & PS & Field staff)
Fertilizer Advisory Committee (CHO, Sen. Agronomist)
Forum Editorial Committee (CHO)
FFHC National Committee (Assistant Director (Field))

Government Civil Engineering Advisory Committee (Assistant Director (Technical))
Government Liaison Committee with Civil Engineering Industry (Assistant Director (Technical))
Grain Competition Judges Committee (Sen. Agronomist)
Grain Research Policy Committee (Grain Specialist & CHO)
Grasslands Liaison Committee (PC & EO, A & PS, CHO)
Grassland Society of South Africa 7th Congress (SPS, SAHS, A & PS)
Grassland Society Organizing Committee (SPS)
Gwanda Show Committee
Gwebi College Council (Director)

Hartley-Gatooma Water Development Committee

Information Services—Cattle Films (SAHS)
Influx Committee (CTO)
Insiza Rural Council Roads Committee
Internal Affairs Irrigation Policy (Sen. Agrnomist)
Inter-nation Commission on Irrigation and Drainage (CIO)
Inyanga Show Society (EO Inyanga, Horticulturist, Rusape)
Irigation Association of Rhodesia (Executive Committee) (CIO)
Irrigation Co-ordinating Committee Victoria (APC & EO)

Lesapi Dam Committee (unofficial) (PC & EO)
Livestock Improvement Committee (Director—Chairman, SAHS)
Lowveld and Makoholi Research Liaison Committee (PC & EO)
Lowveld Research Committee (CHO)

Macheke Management Advisory Committee
Makoholi Research Liaison Committee (APC & EO, A & PS)
Manicaland Agricultural Society (PC & EO)
Manicaland Branch of the Ploughing Association (PC & EO)
Manicaland Publicity Association (PC & EO)
Marandellas Management Advisory Committee
Marandellas Show Society (A & PS)
Mashona Cattle Society (SAHS)
Matabeleland Development Council (PC & EO)
Matopos Research Liaison Committee (PC & EO)
Metrication Council—Agricultural Technical Services (Sen. Agronomist, AE, TO)
Metrication Council—Pesticide Sub-committee (Sen. Agronomist)
Midlands Research Liaison Committee
Ministry of Agriculture—Irrigation Development Committee (CIO, CPO)
Ministry of Agriculture—Publicity Committee (Assistant Director (Technical), PO)
Ministry of Agriculture—Subdivision Committee (CPO)

National Executive Committee of YF/NR Clubs (CTO)
Natural Resources Board (Director)
NRB General Purpose Committee (Assistant Director (Field))
NRB Mineral Resources Committee (Assistant Director (Technical))
NRB Resource Education Committe (CTO)
NRB Wild Life Conservation Committee (Assistant Director (Technical))
ICA Committees (Field staff)
National Canners' Liaison Committee
Nyamandhlovu Aquifer Watchdog Committee

Odzani and Umtali Irrigation Board (EO, Umtali North)
Oilseeds Competition Judges Committee (Sen. Agronomist)
Oilseeds Research Policy Committee (CHO, Oilseeds Specialist, CE)
Oriental Tobacco Advisory Committee (Sen. Tob. Specialist)

Ploughing Association of Rhodesia (AE (F)-FMTS)
Provincial and District Conferences (PC & EOs)

RAJ Editorial Committee (Assistant Director (Technical), CTO, PO)
Regional Committees of YF/NR Clubs (SYES)
Rhodesia Crop Science Symposium (SFMS, Sen. Agronomist)
Rhodesia Crop Seeds Association Executive Committee (Sen. Agronomist)
Rhodes Inyanga Experiment Station Liaison Committee (Horticulturist, Rusape)
RNFU Branch (Field staff)
RNFU Commodity Committee (Field staff)
RNFU—Ministry monthly meetings (Member of Directorate)
Rhodesia Oilseds Producers' Association Executive Committee (Oilseeds Specialist)
Rhodesia Potato Producers' Association Executive Committee (Sen. Agronomist)
Rhodesia Ecological Committee for the Conservation of the Environment (Recce) (CTO)
Rhodesia Registered Cattle Breeds Council (SAHS)
Rhodesia Seed Potato Association Executive Committee (Sen. Agronomist)
Rhodesia Viticultural Association Executive Committee (Horticulturist)
Rothmans' Grower of the Year Committee (CHO)
Rural Councils (when required) (District staff)

SARCCUS (Director)
SARCCUS Agricultural Engineering Sub-committee (CE)
SARCCUS Standing Committee on Erosion and Runoff Control (CE)

SARCCUS Standing Committee for Extension and Education (CTO Chairman)
SARCCUS Sub-committee on Land-use Planning and Farm Business Management (CPO)
Shamva Promotion Council (FMS & IO by invitation)
Sheep Producers' Association (SAHS, A & PS)
Soil Balance Committee of the University of Rhodesia (Conservation Engineer)
Soil Survey Liaison Committee (CIO, CPO)
South African Society of Animal Production (SAHS, A & PS)
Standards' Association Committee on Aparian Products (Sen. Apiculturist)
Standards' Association Stockfeeds Committee (SAHS)
SCAM and Sub-committee (CE)
Standing Committee on Farm Mechanization (Assistant Director (Technical), CE)
Standing Committee on Re-use of Effluents (CIO)

Tillage Trials' Committee (AE(T), CE)
Tobacco Marketing Board (CHO)
Tobacco Research Board (Director)
Tobacco Seed Association Executive Committee (CHO)
Tobacco Seed Association Technical Committee (Sen. Tab. Specialist)
Tripartite Agreement Meeting on Seed Maize (Sen. Agronomist)

Umkauzaan Problem Meeting (A & PS)
Umniati River Complex Planning Committee (PC & EO)
Umshandige Water Board

Vlei Utilization Committee
Veld and Pasture Research Policy Committee (SPS)
Victoria Stockowners' Association (A & PS)

Water Court and Town and Country Planning
Water Pollution Advisory Board (CIO)
Weaner Committee (Headlands) (GO, Rusape)
Wengi Proving Unit (PC & EO, GC & EO Mazoe, Irrigation Specialist, Secretary)
Wiltiper Society AGM (AHS)
Wool Marketing—Internal Affairs (AHS)

YFC Council (SYES)

CIO	Chief Irrigation Officer
AHS	Animal Husbandary Specialist
AE	Agricultural Engineer
TO	Training Officer
CPO	Chief Planning Officer
PO	Publications Officer
AE (F)	Agricultural Engineer (Field)
AE (T)	Agricultural Engineer (Training)
FMTS	Farm Machinery Training Specialist
SYES	Senior Youth Extension Specialist
SFMS	Senior Farm Management Specialist
FMS	Farm Management Specialist
IO	Irrigation Officer
GC & EO	Group Conservation & Extension Officer
PC & EO	Provincial Conservation & Extension Officer
A & PS	Animal & Pasture Specialist
SAHS	Senior Animal Husbandry Specialist
APC & EO	Assistant Provincial Conservation & Extension Officer

APPENDIX X

Veld management

Systems planned by the Department of Conservation and Extension during the year ending 30th September, 1972

Province	Conex plans completed				Farmer courses and field days	
	Systems not operating		Systems operating			
	Plans	Hectares	Plans	Hectares	Number	Attendance
Short duration grazing						
Manicaland	77	7 874	189	98 642	61	1 389
Mashonaland North	9	11 795	4	7 600	45	2 280
Mashonaland South	34	43 983	71	96 241	3	60
Matabeleland	—	—	10	40 751	16	308
Midlands	135	219 567	50	163 598	43	732
Victoria	—	—	—	—	43	2 929
Totals	255	283 129	324	406 832	211	7 698
Other approved grazing systems						
Manicaland	6	63 044	101	47 882		
Mashonaland North	21	3 810	3	204		
Mashonaland South	3	3 870	10	18 716		
Matabeleland	—	—	16	70 000		
Midlands	—	—	—	—		
Victoria	—	—	7	9 953		
Totals	30	70 724	137	146 755		
Grand totals	285	353 853	461	553 587		

Total area planned during year ending 30th September, 1972 . . 907 440 hectares
Total area planned to date . . . . . 5 668 280 hectares
Total farming area (excluding Tribal Trust Lands) . . . . . 16 473 493 hectares
Percentage planned to date 34,4%

Annual Report of the Director of Veterinary Services

for the year ending 30th September, 1972

General

THE above average rainfall in all districts this last season provided the basis for record production in most agricultural commodities. The maize crop was by far the largest ever produced and at a payment of $2,74 per bag (91 kg) the return to farmers was disappointing but not unreasonable in present circumstances. Likewise cotton production achieved a new peak and the price was 16,55 cents per kilogram. Sales of groundnuts were also a record and at a price of $11,25 per 82 kg bag for expressing quality nuts contributed substantially to the income of African farmers. Over-all wheat acreage was adversely affected by the continuing wet season which delayed planting and at $7 per bag (91 kg) provides a good return when yields can be kept above 4 500 kg per hectare. Tobacco with a limited crop target of 66 000 000 kg and a guaranteed average price of 50,1 cents per kg continues to be adversely affected by the political climate.

The rewards of record production unfortunately continue to elude the farmer who is bedevilled by rising in-put costs. Unlike many of the commercial fraternity he is unable to add on a substantial margin of profit.

Disease summary

After a period of phenomenal freedom from epidemic diseases in recent years, we suffered the reappearance of several viral conditions.

In December, 1971, Newcastle disease was diagnosed in fowls at an African market in Salisbury and over the next few months gradually spread until at the present time the disease continues to smoulder in African areas in northern Mashonaland.

On the 8th January foot and mouth disease was confirmed on Eureka Ranch in the Nuanetsi district. This outbreak was successfully contained on this one property and no extensions took place. On the 14th of September another outbreak was confirmed in African-owned cattle in Ndanga Tribal Trust Land, which is also in the Fort Victoria province. At the end of the period covered by this report (30th September, 1972) the infection is still active and strenuous efforts are being made to contain the disease within this and adjacent Tribal Trust Lands. Both these outbreaks were due to South African Type II (two) virus.

In April sporadic cases of Lumpy Skin disease (Neethling strain) were confirmed in cattle on a few farms north and west of Salisbury. In spite of an unusually prolonged cold winter the incidence of this disease, and also its severity, continued to increase until July. Latterly there have been few reports and it is hoped that the infective wave has passed. Generally, mortality and even the number of cases on any particular property were minimal but some very unpleasant lesions in the form of severe ulceration and cracked skin on the extremities occurred. Animals under intensive managament had the worst incidence, possibly aggravated by the presence of excess flies. Bulls also appeared to contract the infection more readily terminating in sterility in some cases. Sales of preventative vaccine rocketed from an average of just over a thousand per year to 81 000 doses between April and September this year.

Good progress continued to be made against our largest veterinary problem, the control of trypanosomiasis and the tsetse fly.

Staff

Veterinary officers

Our veterinary surgeon establishment was increased from 46 posts to 48 with effect from the 1st July, 1972, by approval for the appointment of a pig specialist and an additional Veterinary Public Health Officer. Both these posts were satisfactorily filled. During the year three veterinary officers resigned—two to go into private practice locally and one to take up a research appointment in Britain. These losses were off-set by the recruitment of five graduates, four of whom are recently qualified Rhodesian students and the remaining officer is an experienced virologist, who was already employed in this country.

Numerically we are better off than at any time previously as evidenced by the following summary:

	1969	1970	1971	1972
Establishment	46	46	46	48
Permanent	34	35	40	42
Contract appointment	3	1	1	1
Temporaries	—	2	2	2
Vacant posts	9	8	3	3

With seven Rhodesians due to graduate in December, 1972, and 14 others in various stages of their course, future employment for these men would appear to be the problem, particularly as our need will be experienced officers with a specialized bias in one of the following aspects: infertility, helminthology or veterinary entomology.

Congratulations are extended to Dr. Keith Lander who passed his Diploma in Bacteriology with distinction at the London School of Tropical

Medicine, and a further officer, Dr. Colin Stewart, is presently taking his M.Sc. in Parasitology at London University. Three other permanent officers are at advanced stages in their studies for Ph.D. degrees in various disciplines. These specialist qualifications will add appreciably to the competence of our diagnostic services.

Animal health inspectors

It is my privilige once again to acknowledge the vital role played by our Animal Health Inspectors in disease control in all its aspects. These men and their counterparts—the Tsetse Field Officers in the Tsetse and Trypanosomiasis Control Branch—are the ears and eyes of the Department and they make the wheels turn. Both have a very arduous daily routine under trying conditions in the field and we are grateful for their loyalty and persistence. We continue to hope that their efforts will sometime be rewarded by a more equitable salary structure.

From a staff of 83 junior grade Animal Health Inspectors there was a loss of 21 men—25 per cent. Considering the amount of effort put into the training of these officers in their initial period of service this is a wastage we can ill afford.

Training Courses

The training courses run by the Training Officer, Mr. H. S. de Bruijn, and his assistant, Mr. H. B. Bezuidenhout, continue to give excellent value to our staff, the Ministry of Internal Affairs and to a wide section of persons concerned with the implementation of disease control, as is evident from the following courses given:

16 x 5 day courses for Animal Health Inspectors;

1 x 3 day course for Senior Animal Health Inspectors;

15 x 2 day dipping courses for Dip Attendants;

10 x 1 day courses for Dip Attendants;

2 x 2 day dipping courses for Field Assistants and Primary Development Officers;

60 x 1 day dipping courses for Chiefs, Headmen and Councillors;

3 x 5 day courses for Departmental Field Orderlies;

30 lectures at Domboshawa and Gwebi Agricultural Colleges.

Twelve Animal Health Inspectors sat their qualifying examinations, of whom eleven passed —two passed with distinction and five with merit grades.

Meat Inspectors

At the risk of sounding repetitious, it is again a pleasure to have the opportunity in this report to record the Department's gratitude to this body of men. From Abattoir Supervisors to Learner Meat Inspectors they have taken on the task of maintaining standards through a year which has seen an unprecedented increase in cattle slaughterings, and the highest productivity in the meat industry in general in this country's history. The indispensability of this service, which has been accomplished conscientiously and with little or no complaint through days of ten to twelve-hour slaughter periods, and which has meant the sacrifice of innumerable Saturday and Public Holiday free time in the interests of the beef industry, is often too little recognized or rewarded.

Two qualified meat inspectors joined the service during the year and three resigned. The five existing vacant posts will be filled from the ranks of seven trainees who qualified at the end of September.

A special tribute is due to Dr. J. T. R. Robinson, Chief Veterinary Public Health Officer, and those who assist him in the annual training of meat inspectors. Had this scheme not been initiated the meat inspection service could not have continued to function. Four additional posts were authorized during the year giving a total of 33 inspectorate staff, six learners and four veterinary officers.

Establishment for learner meat inspectors, we hope, will be increased to nine posts in 1973 to provide for the staffing of new Cold Storage Commission abattoirs due to open in January, 1974, at Marandellas and in January, 1975, at Sinoia.

Technologists

The Senior Technician, Mr. G. E. Wells, began a well-earned retirement after 44 years of service in the laboratory. We thank him for his devotion to the Department and the innumerable extra hours he worked in times of crises.

Mr. B. D. Vickers was appointed to the newly created post of Chief Technologist.

Tsetse Control Branch

Dr. G. F. Cockbill retired from the post of Assistant Director of Veterinary Services (Tsetse and Trypanosomiasis Control) on 17th April, 1972. Appointments consequential upon this retirement were Mr. D. F. Lovemore to the post of Assistant Director of Veterinary Services (Tsetse and Trypanosomiasis Control), Mr. R. D. Pilson to the post of Chief Glossinologist, Research Stations and Field Investigations.

Four glossinologists and 11 tsetse field officers resigned during the year. Two glossinologists and all the tsetse field officers have been replaced but the other two glossinologist posts remain vacant,

although we are currently in contact with potential recruits. The difficulties of retaining staff who have to work and live under bush conditions are "highlighted" by this turnover.

One senior tsetse field officer post, two tsetse field officer posts and eight tsetse field assistant posts were provided with effect from 1st July, 1972. The incumbent of the senior tsetse field officer post will be employed full-time on in-service training of lay-staff.

Housing and Office Accommodation

Staff housing continues to be a matter of embarrassment and irritation. Animal Health Inspectors have had to be withdrawn from Hartley, Tjolotjo, Buhera, Selukwe and Liebig's inspectorates, there being neither Government nor private accommodataion available. These inspectorates are temporarily covered from either provincial or district offices, thereby increasing travelling costs and inconvenience to the public. The Chipinga office has also been short staffed for over a year due to lack of housing. Only one house has been built for the Field Branch in the last four years and the only other progress has been made by taking over abandoned or redundant quarters from other Ministries or Departments.

On the office accommodation side the picture is more cheerful, with new offices at Gatooma, Mount Darwin and Inyanga. $50 000 was provided in current estimates for a new laboratory block at our research centre on the Borrowdale road, and there is a firm commitment for $50 000 in July, 1973, and for $100 000 in July, 1974, for Tsetse Control Headquarters.

The new virology block at the Laboratory was completed earlier this year and will fulfil a most pressing need. We have been dependent on the good offices of our friends at Onderstepoort and elsewhere for too long being unable ourselves to investigate problems caused by the more obscure viruses. The new unit is small but well equipped and we have been particularly fortunate in recruiting the services of Dr. R. Swanepoel, an experienced officer with a Ph.D. degree in virology. Also in getting the services of Mr. N. K. Blackburn a new immigrant Technologist, who has had several years experience in tissue culture work.

Another useful addition to our facilities has been the completion of an infectious diseases stable, which includes a modern oil-fired incinerator. This fly and tick proof unit will permit work on infectious diseases under conditions of adequate security.

LIVESTOCK

In spite of an excellent past rainy season and in consequence a negligible number of deaths from poverty, it is surprising to find that total cattle numbers have increased by only 20 568 head. The relevant figures are given below:

Year	*European-owned cattle*	*African-owned cattle*	*Total*
1971/72	2 683 955	2 889 587	5 573 542
1970/71	2 708 997	2 843 977	5 552 974
Difference	−25 042	+45 610	+20 568

Increases in previous years have been:

1970/71	+230 354	+114 391	+344 745
1969/70	+253 585	+176 895	+430 480
1968/69	+244 502	+ 51 557	+296 059
1967/68	+173 624	+163 609	+337 233
1966/67	+102 971	+198 325	+301 296
1965/66	+ 46 999	− 61 815	− 14 816

The decrease in 1965/66 was due to a catastrophic drought—African-owned cattle particularly died by the thousands, also an increased Cold Storage Commission slaughter figure at that time accounted for an extra 25 000 head. Even in 1968/69 when the severe cold spell killed 126 000 cattle, we were still able to record an increase of 296 000. Comparing that year with the present time and assuming that the increased slaughter figure this year is more than off-set by the 126 000 head lost from cold in 1968/69, there is still an alarming deficit of approximately 275 000 head (296 059 less 20 568).

Beef Cattle

Many ranchers have decided to retain their steers until fit for slaughter. To do this they have had to reduce their breeding herds and, in addition, the weaning percentage this year is estimated to have dropped from 61 per cent. to 54 per cent. A comparison of C.S.C. slaughter figures over the last two years shows that the number of bulls and calves slaughtered each year were almost identical, that the number of oxen slaughtered increased by seven per cent. but the number of females slaughtered rose by 53 per cent. Remembering that the total females processed the previous year was in itself a record, the present trend is most disturbing.

The following observations by Dr. J. T. R. Robinson, our Chief Veterinary Public Health Officer, should be noted:

"On the basis of various surveys undertaken over the past few years, it can be conservatively estimated that 100 000 unborn calves were slaughtered with their mothers during the past year, i.e., 10 times the number that were utilized as vealers, and 80 per cent. of the capacity of a fair sized abattoir which could have received them in 1975 as beef.

"From the annual grading returns, it can be estimated that approximately 70 000 or 30 per

cent. of females slaughtered were six-tooth or younger, i.e., at the beginning of their useful breeding life.

"Of the total kill, females now comprise 44,2 per cent., as compared with 21 per cent. five years ago.

"While no one wants to 'cry wolf' unnecessarily, it must be pointed out that this trend towards ever greater and ever younger female slaughterings is accelerating, and reassurance should be sought that this country is not busy emulating the self-inflicted misfortune of some South American states which discovered too late that they had slaughtered an excess of their breeding herd, and the next generation of it."

In view of the commissioning of two new export abattoirs, one at Marandellas in January, 1974, and the other at Sinoia in January, 1975, some incentive to increase beef production is indicated. During the year the price of all grades to the consumer was increased by 3,31 cents per kilogram, and the average return to the producer is expected to rise from 37,86 cents per kilogram to about 39,86 in 1972. The high price feeders (store bullocks) however, has narrowed the margin of profit in maize feeding and of course indications are that the supply of this class of stock will be even more restricted. Certainly the market price of all types of cattle has risen sharply in recent months.

The number of cattle slaughtered at C.S.C. abattoirs rose by 28,3 per cent. in 1970, by a further 19,6 per cent. in 1971 and by yet another 23,9 per cent. in 1972. The prospect of quoting a corresponding percentage in 1973 unfortunately looks gloomy, particularly as African owners continue to show no desire to part with a reasonable number of their animals—see comments under African Cattle Sales, page 66.

Dairy cattle

Last year's record milk production was exceeded by 7 per cent. and payment to the producer at 6,71 cents per kilo was the highest price for several years. The average production per farm increased.

Mastitis is the main disease problem in these herds and useful work on this condition is being done at the Veterinary Investigation Unit at Bulawayo and by the University of Rhodesia.

All dairy herds from which milk products are sold continue to be surveyed for the presence of tuberculosis. It is pleasing to report that of the 14 934 animals tested only 11 head were classed as reactors to the test. No evidence of tuberculosis was found in these 11 carcasses at time of slaughter.

Sheep

Last year I reported an 11 per cent. drop in the number of sheep slaughtered at C.S.C. abattoirs; this year the decrease is an additional 28,6 per cent. C.S.C. prices for lamb were raised by 18 per cent. and for mutton by 22 per cent., but there is clearly a lot of disillusionment among producers. Sheep numbers owned by Europeans have dropped by 54 307 (16 per cent.) and the African-owned total decreased by 36 269 head (7 per cent.).

I have no reason to change the observations made in my Annual Report for 1971 which were to the effect that:

"Rhodesia as a whole is not a good country for sheep production. The higher rainfall areas are too wet for haired sheep and the seeds of some indigenous grasses present problems for the woolled breeds.

"Also, other than in the lowveld, the grass gets too rank and is of low nutritive value. Flocks grazed continuously on planted pastures have been disappointing, and in some cases have suffered from goitre and unthriftiness. In the past many owners have had promising results from small flocks, but when these were increased appreciably in the highveld, troubles multiplied disproportionately. In most cases these adverse results could be attributed to a massive build-up of internal parasites and failure of the owner to anticipate the increased challenge. In spite of the excellent vermicides now available this still occurs but other factors sometimes also appear to be involved. The sheep flock invariably receives the last call on the owner's time, and the grazing pattern is too often left to the initiative of the 'sheep piccanin'."

Although "cluelessness" and lack of constant attention are generally the reasons for disappointment, in three instances knowledgeable producers have abandoned sheep because of the appearance of an unidentified virus which decimated their lamb crop. This affliction was not typical of the Enzootic Abortion (Chlamydiosis) which seriously affected flocks in the Republic of South Africa. With the assistance of experts in the Republic and Britain we are still trying to determine the exact cause of these abortions.

Goats

Goat numbers, almost entirely owned by Africans, decreased by 70 000 (4 per cent.). Several attempts have been made during the year to establish regular supplies of goats for existing and potential export markets, and a new privately-owned export abattoir is now operating in Umtali under this Department's supervision. Continuous or even adequate supplies have not been achieved,

whether through the Ministry of Internal Affairs or by private treaty. Total slaughterings at this and other abattoirs have not accounted for the 4 per cent. decrease recorded.

Pigs

Pig slaughterings at Colcom centres continued their downward trend by a further 11 per cent. and this year's total is the lowest for at least five years and possibly longer. Falls in the number of pigs slaughtered have been fairly evenly distributed, with African-owned pigs in Matabeleland and European-owned in Mashonaland showing the biggest drop.

A veterinary officer with specialized knowledge of pig problems was appointed during the year and he will continue the role previously undertaken when he was employed by the Pig Industry Board.

Poultry

The poultry industry is now largely in the control of the big producers and hatcheries to the apprehension of small concerns. Their technical expertise and proven stock have, however, ensured high quality products at prices which are within the means of most families. Now that Newcastle disease is firmly established in Mashonaland, producers, particularly the large establishments will have to pay meticulous attention to routine vaccination against this disease. This necessary routine is laborious and the costs have had to be passed on to the consumer, but as yet the effect has not been apparent.

It is the African, unfortunately, who is likely to be most adversely affected by the presence of Newcastle disease in Rhodesia. The movement of fowls in crates on the back of bicycles is likely to continually initiate new outbreaks, either in areas which have previously escaped infection or where birds have re-established themselves. Fowls are a considerable source of protein to these people and the African owner is least able to protect his birds by vaccination.

Rabbits

Rabbits do very well in this country and their fertility has never been suspect. The infant industry has good export prospects if there was some co-ordination to overcome the handling and marketing aspects. Breeders at present cater almost exclusively for the local European demand.

Game ranching and Safaris

The idea that land could be more economically used by the cropping of game for sale as venison than the traditional rearing of beef cattle has fortunately lost credence. Certainly advocates of this practice have been silent in recent years. A much more realistic and profitable approach in the use of game for mini-safaris, either for photography or sport hunting by wealthy visitors, is a welcome development. Under this system the meat is merely a useful by-product and there is some hope that the natural increase of the various species of game will be able to keep pace with the more restricted demands of sport hunters.

Only on three properties are game still being shot in appreciable numbers for sale as meat. Of the 2 440 carcasses inspected most were impala with smaller numbers of wildebeeste, kudu, steenbok, zebra and giraffe.

BORDER CONTROL

Lundi–Limpopo Game Fence

This game fence was erected in 1962 and has been markedly successful in diminishing the incidence of foot and mouth disease outbreaks in that corner of Rhodesia. The fence is 176 km long and constructed of ten-strands of high tensile wire on 2,28 metres hardwood poles. In the south it is supplemented by a parallel cattle fence from the Limpopo to the Nuanetsi River thereby ensuring a stock-free corridor along this sector, where the greatest danger of contact exists. At the northern end an all-metal game fence is being built parallel to this fence at a distance of three and a half kilometres from the border. In the corridor between these fences small herds of Departmental cattle will be kept at strategic points to detect any re-invasion of the tsetse fly belt, which has now been pushed back some eighty kilometres into Moçambique. It may be remembered that six years ago this fly belt extended well into Matibi II Tribal Trust Land sixty-five kilometres within the border. Apart from the tsetse control aspect this game fenced corridor will serve as a most useful obstacle to the invasion of foot and mouth disease.

Kazangula Game Fence

This 120 km game fence stretches down the Botswana border from the Zambezi River to Panda-ma-Tenga. It was built to break contact between cattle in the Matetsi area and the game and cattle living in Botswana. Now that it has been decided to remove cattle from Matetsi the fence will continue to serve as a useful barrier to the movement of game across this border and to the illegal entry of vehicles. The most northerly section, twelve kilometres in length, was recently reconstructed with an all-metal type game fence.

Matetsi Game Fence

The first part (125 km) of this fence is currently being built by the Department on behalf of the Ministry of Lands and Natural Resources. When linked up with the present Wankie Game Fence it will completely separate the Wankie/Matetsi game area from the cattle areas which lie to the east.

Cattle Fences

Numerous foot and mouth disease control cattle fences in the lowveld continue to be well maintained and the barbed wire on the Botswana border fence (Plumtree to Beacon 171) has been renewed and a good road constructed along this sector.

Quarantine Camps

The Department runs eight veterinary quarantine camps in the lowveld of Fort Victoria Province. These camps are strategically situated on the various cattle exit routes and ensure that any cattle moving from this foot and mouth disease prone area to other parts of the country undergo a ten-day detention period. The stock are inspected on arrival, again five days later, and finally immediately before release. They also undergo three dippings and charges to the owner are limited to three cents per head for each dipping.

Imported stock are detained at the Bulawayo Veterinary Quarantine Yards for tuberculin testing in the case of cattle and to check whether other import conditions have been fulfilled in respect of all animals. Income from this source amounted to $6 242 this year.

TICK LIFE AND DIPPING

My annual reports in recent years have consistently drawn attention to a deterioration in the standard of tick control, particularly in the African areas. This had come about for a number of reasons, more especially the almost complete absence of mortality from tick-borne diseases. Deaths from redwater, gallsickness, heartwater and theileriosis in African-owned cattle could be counted in tens not hundreds and this was in spite of gross tick infestation in some Tribal Trust Lands. The reason for this apparent paradox was of course the fact that efficient dipping over the previous thirty to forty years had almost completely eliminated the carrier state in these African-owned cattle. Even although there were masses of ticks, from the disease aspect they were sterile and unable to transmit the above-mentioned conditions. If this state of affairs had been allowed to progress indefinitely it was only a matter of time before infection re-entered some of these cattle with consequent heavy mortality when the ticks re-acquired the parasites. Other factors contributing to poor tick control were the progressing resistance of ticks to arsenical dips leading to disillusionment of the owners in the necessity and efficiency of regular dipping, inefficient management due to the multiplicity of duties being imposed on supervisory staff, the delegation of this service to inexperienced African Councils, and a host of other minor considerations all of which diminished the effectiveness of dipping. With this climate having prevailed for some years, it is therefore greatly to the credit of the Ministry of Internal Affairs that this year they grasped the nettle firmly.

The first step in re-establishing good tick control was to use an effective tick-destroying agent in the form of Delnav D.F.F. in place of arsenical dips. This alone involved a six-fold increase in the cost of dip concentrate to a service which was already heavily subsidised. Part of this increased expenditure was passed on to the African owner by raising the annual dip fee from thirty cents to one dollar per beast, with a remission of fifty cents per beast if the fee was paid promptly. In other respects there has also been an all-round "spring cleaning exercise" with better supervision, renovation of dipping tanks, improved water supplies and greater control on inefficient Councils. It has not been possible to implement the new programme in all areas but we can report very substantial progress this year.

Our own staff contributed very substantially to this exercise by calibrating dip tanks, training supervisory Internal Affairs staff and developing a routine which would ensure an up to strength dip wash. A point which has emerged is that the smaller smooth coated indigenous type animal removes only two pints of wash from a well constructed dip tank and not half a gallon, the figure normally quoted for cost purposes.

In the European sector there has also been an improved attitude towards good tick control on the part of the more intelligent owner. The more favourable tick environment in the form of grass cover and temporarily unutilized paddocks on these properties presents a constant challenge to the owner's vigilance. In addition to a sound routine of dipping all animals at regular intervals in a dip wash which is up to strength, the development of tick resistance to arsenic and toxaphene on some properties means that the farmer must ensure that he is using the best dip for his particular problem. Our officers are always willing to investigate difficulties and tick control problems, and in this respect we are indebted to a commercial firm which, without charge, tests samples of ticks for resistance.

Unfortunately a small minority of cattle owners still try to get by with as little tick control as possible and are quite happy to have infested stock if they are not seen by a Departmental Inspector. Such people are deceiving nobody but themselves. In Rhodesia deaths from tick-borne diseases, although they may be a source of serious loss to the person concerned, are of minor consequence in the national picture but the insidious losses due to poor tick control are undoubtedly of greater significance. Herds which regularly get infested with brown "ear and eye" ticks, suffer

from tick toxicosis, loss of blood, interference with their grazing time in an effort to get away from flies, screw worm infestations and, in general, end up a grade lower in condition than would otherwise have been the case. Similarly it has been proved that an animal constantly infested with "X" number of blue ticks (boophilids) fails to gain "X" pounds in weight in a year. The minority referred to above would do well therefore to give thought to these aspects before congratulating themselves on having escaped the attention of the Department.

Quarantine Orders for Tick Infestation

The improved position is not reflected in the under-mentioned figures, largely because of some civil obstruction at the time of the Pearce Commission. Failure to dip in accordance with the Cattle Cleansing Regulations automatically earned a quarantine order.

	European-owned properties	*African areas*	*Total*
1971–72	967	1 314	2 281
1970–71	1 003	1 458	2 461

Contraventions

	Persons	*Fines* $
Cattle Cleansing Regulations	1 366	12 515
Movement of Cattle Regulations	62	501
Rabies Regulations	438	3 351
Trypanosomiasis Regulations	18	282
Stock Register Regulations	53	479
Animal Health Act	97	1 029
Cruelty to Animals Act	24	285
	2 058	$18 442
1970–71	2 725	$19 760

Cattle Inspected

	European	*African*	*Total*
Mashonaland	1 960 145	1 662 071	3 622 216
Matabeleland	1 332 191	3 802 115	5 134 306
Manicaland	523 163	1 412 738	1 935 901
Midlands	932 590	1 721 050	2 653 640
Victoria	2 965 753	3 718 859	6 684 612
Sinoia	1 208 752	481 094	1 689 846
Gwanda	855 794	1 465 025	2 320 819
Chipinga	182 443	653 129	835 572
Total	9 960 831	14 916 081	24 876 912
1970–71	10 765 590	16 118 509	26 884 099

European Cattle Sales

Ninety-four extra sales were held but only 4 000 more head were sold than in 1971.

	Sales	*Yarded*	*Sold*
1971–72	659	295 389	234 734
1970–71	565	308 746	230 252

Prices at the beginning of the year were low particularly for female stock, latterly they have increased markedly reflecting the strong demand for feeders.

African Cattle Sales

District	*Sales*	*Yarded*	*T.I.*	*Re-jects*	*Re-fusals*	*Sold*
Mashonaland	73	6 388	89	157	2 165	3 977
Matabeleland	176	24 178	523	189	3 062	20 404
Manicaland	33	6 364	6	4	2 095	4 259
Midlands	77	11 189	180	14	3 105	7 824
Victoria	126	18 109	21	22	4 511	13 555
Sinoia	8	469	1	8	170	290
Gwanda	81	18 223	64	12	1 408	16 739
Chipinga	25	3 125	27	1	483	2 614
Total	599	88 045	911	407	16 999	69 662
1970–71	709	134 585	1 968	1 312	36 313	95 040

The following table shows the number and percentage of African cattle sold in each district:

District	*Total African cattle*	*No. Sold*	*% 71–72*	*% 70–71*	*% 69–70*	*% 68–69*
Mashonaland	582 705	3 977	0,68	1,14	1,32	1,72
Matabeleland	517 599	20 404	3,94	5 13	4,25	3,53
Manicaland	472 617	4 259	0,90	1,56	2,08	1,60
Midlands	397 295	7 824	1,97	2,19	2,66	1,65
Victoria	557 793	13 555	2,43	4,71	4,27	5,18
Sinoia	188 689	290	0,15	0,63	0,75	0,66
Gwanda	92 773	16 739	18,04	9,50	9,95	8,92
Chipinga	80 116	2 614	3,26	6,28	7,66	9,34
Total	2 889 587	69 662	2,41	3,40	3,47	3,56

One can only look at these tables with despair particularly when one remembers the position prior to 1961, when District Commissioners enforced the culling of old and scrub stock to hold the stocking rate of a T.T.L. within an assessed maximum. In those days each T.T.L. had an accepted stock carrying capacity and about March each year all cattle in the T.T.L. were counted by the District Commissioner or his Livestock Officer. Barring droughts the natural increase during the previous twelve months gave a figure above the assessed maximum. Knowing this excess figure, the Livestock Officer then culled all old animals and runts at each dipping centre until this total was reached. Animals culled in this way were branded and the owner told to get rid of the animal within three months. This exercise did not either add to or detract from an owner's authorized holding right, which remained the same.

In practice the owner got rid of all animals which had been branded and if this action reduced his herd below the authorized number he could make up the difference by buying within the T.T.L. to re-establish his permitted total. In this way the total number of cattle in any T.T.L. was kept more or less constant, the excess stock being sold annually. From the moment this enforced system of culling was abandoned by a change in policy the number of African-owned cattle sold annually crashed to the ridiculous figures reproduced below for the years 1966 to 1972. These figures are all the more serious when it is seen that the total African-owned herd has increased by 796 000 head over the 1959 census. Even at the previous (1959) percentage off-take

the total sold should be in the vicinity of 200 000 instead of the paltry 69 662 head reported this year.

As the Ministry of Internal Affairs do not now publish the details given previously, I am unable to reproduce their figures, but except in so far as our figures do not include the few animals sold under Section 6 of the Marketing Act, our totals are accurate being taken from permits issued by staff at all sales.

Extract from the Annual Report of the Secretary for Internal Affairs, 1963:

	Census	Organized sales	Others	Deaths	Home slaughterings	Total disposals
1956. .	1 927 198	109 670	7 038	38 948	73 036	228 692
1957. .	1 980 928	116 186	12 126	45 155	77 263	250 730
1958. .	2 073 592	139 551	13 783	47 686	78 808	279 828
1959. .	2 093 401	139 644	12 533	56 296	72 770	281 243
1960* .	1 953 558	213 469	23 066	98 061	73 959	408 555
1961. .	1 988 116	68 255	20 037	44 080	51 251	183 623
1962. .	2 090 725	73 463	17 847	42 336	49 174	182 820
1963. .	1 873 750	68 681	17 683	51 848	60 705	198 917

* Drought year.

Sales of African-owned cattle, 1966–1972

	Census of African-owned cattle	No. sold on Internal Affairs organized sales
1966–67	2 337 525	67 503
1967–68	2 501 134	79 362
1968–69	2 552 691	84 943
1969–70	2 729 586	94 762
1970–71	2 843 977	95 040
1971–72	2 889 587	69 662

Once again it is clearly evident from the Mashonaland totals, that Africans do not sell their cattle if a reasonable rainy season allows them to subsist on their grain crops during the ensuing year.

We are all aware that Rhodesia has her political problems, but solving these will be of no avail unless the problem referred to above with its concurrent consequence of over-grazing on the soil is also solved.

SPECIFIED DISEASES

Viral diseases

Foot and Mouth Disease: During the period covered by this report, 1.10.71 to 30.9.72, two outbreaks of this disease occurred and both were due to South African type II virus—normally referred to as SAT II infection.

Eureka Ranch Outbreak: The first outbreak was diagnosed on the 8th January, 1972, on Eureka Ranch in the Nuanetsi district. Due to detection of infection at an early stage, excellent paddock fencing on the property, good perimeter roads and adequate grazing within the property, the disease was successfully confined to the 1 260 cattle, 135 sheep, 50 goats and two pigs on the ranch. With good stock-free zones all round the property, vaccine was not required.

In this outbreak it is strongly suspected that infection originated in game which inhabit a large unoccupied piece of land adjoining the ranch.

Ndanga Tribal Trust Land Outbreak: Infection in this Tribal Trust Land was found during a routine inspection on the 23rd September. Control measures were most difficult due to an absence of fences in a communally grazed Tribal Trust Land. It was therefore necessary to withdraw to the perimeter where fences separate the African area from farms occupied by Europeans. Certain sectors adjacent to other African areas have had to be fenced to give reasonable control of stock. The outbreak was still in progress at the time this report terminates—30th September. At this stage it is not possible to assess the number of stock likely to be involved but the figure will inevitably be large.

It is probable that infection was likewise carried into the Tribal Trust Land on meat from game, in this case shot or poached in the vacant Mkwasine land. This land had just been alienated but the new owners were not yet in occupation. The last outbreak in Ndanga T.T.L. was in 1953.

Preventive foot and mouth vaccinations were again carried out on the 51 000 cattle on Liebig's Ranch, this being the seventh successive year. The 5 000 domestic stock in the Matetsi area were also vaccinated in March and July as a precautionary measure.

Rabies: There was a slight improvement in the rabies position, particularly in the last few months of the year. Total confirmed cases dropped from 130 in 1971 to 106 this year. The species affected were:

Total: 106

Jackals	53	Wild cat	1
Cattle	18	Rattel	1
Dogs	15	Aardwolf	1
Mongoose	14	Human	1
Domestic cats	2		

The one human case was an African child bitten two months previously by a dog in the Kezi district.

Until there is a concerted and conscientious effort on the part of land-owners to reduce the jackal population, all the Department can do is to maintain a high level of immunity in dogs. With only fifteen cases in this species in the face of a considerable challenge the position could be worse. Dog vaccinations in the years 1970–72

have been 363 129; 349 633 and 323 593 respectively. Heavy commitments with the Newcastle disease outbreak in the early part of the year interfered with rabies vaccination programmes and accounted for the drop of 26 040 dog vaccinations.

Positive cases in jackals

Year	Jackals	Total + ve cases	Year	Jackals	Total + ve
1964	Nil	21	1969	Nil	32
1965	6	66	1970	10	52
1966	124	224	1971	76	130
1967	78	165	1972	53	106

The close correlation between the incidence in jackals and total confirmations is apparent in the above table.

Rabies Vaccinations 1971/72

District	European	African	Police dogs	Cats	Total	Brain specimens	Positives
Mashonaland	7 538	65 777	133	—	73 448	201	50
Matabeleland	4 660	48 533	15	7	53 215	93	15
Manicaland	1 635	42 406	—	—	44 041	54	13
Midlands	3 767	55 833	—	—	59 600	64	14
Victoria	1 300	51 279	—	—	52 579	28	6
Sinoia	928	11 259	—	—	12 187	16	1
Gwanda	435	15 669	—	—	16 104	9	4
Chipinga	358	12 601	—	—	12 419	38	3
Total	20 621	302 817	148	7	323 593	503	106
1970–71	27 352	322 108	173	—	349 550	588	130

Total dogs vaccinated since 6th September, 1950: 4 222 550.
Total positive cases since 6th September, 1950: 1 926.

Total: 1 926

Confirmed Cases since 6.9.50

Aardwolf	4	Hyaenas	3
Baboons	2	Jackals	504
Cattle	126	Leopard	1
Civet cat	4	Meercat / Mongoose	44
Domestic cats	41		
Wild cat	1	Pigs	5
Dogs	1 121	Rattel	14
Donkeys	1	Sheep	10
Duikers	4	Skunks	4
Horses	3	Squirrels	2
Humans	32		

By using a fluorescent antibody technique a result is usually available within two hours of a suitable sample being received. This test gives an accuracy of 95 per cent. and results are subsequently confirmed either histologically or biologically or by both methods where there is doubt or human involvement. 503 brain specimens were tested of which 106 were positive.

Contagious Epididymitis and Vaginitis: 502 bulls were examined of which 33 had abnormal or diseased testicles. Typical indurated lesions were found on six properties.

Lumpy Skin Disease: After an absence of several years the virulent or Neethling strain of virus reappeared in the early part of the year and, contrary to normal behaviour, the incidence increased throughout the winter. Fortunately the disease was largely confined to a scattering of farms in the northern part of Mashonaland and on most properties morbidity was low and mortality even lower, but some severe lesions both internally and externally were recorded while temporary or permanent sterility in bulls was not an unusual consequence. Sales of vaccine rose from 300 doses in 1971 to 81 486 this year.

African Swine Fever: The last intrusion of this disease was on our northern border in March, 1971. This minor focus of infection was eliminated by slaughtering the fifteen remaining pigs, 10 having died within the previous few days.

Rift Valley Fever: The disease was last diagnosed in May, 1970.

Mucosal Disease: This condition was not confirmed, the minor incidence which appeared in the Marandellas area in 1971 did not recur.

Newcastle Disease: This disease was confirmed in fowls at an African market in Salisbury in December, 1971. In spite of every effort on the part of the Department to contain the condition, it gradually spread to African townships, farm compounds and Tribal Trust Lands.

Departmental staff vaccinated more than half a million birds most of which were owned by Africans, but the ubiquitous movements of birds on the back of bicycles could not be contained and the disease was carried further afield. Newcastle disease must now be regrettably considered as firmly established in African areas in Mashonaland. Only three European-owned commercial producers were involved in one of which heavy mortality occurred.

7 355 500 doses of vacine were sold to poultry producers.

Bacterial diseases

Anthrax: No cases in animals were diagnosed this year. Confirmations in recent years are 1971, one animal; 1970, two farms and 1969, three farms.

Compulsory vaccination of all animals on an infected property is undertaken by Departmental staff for three years after the last case. Thereafter the onus is on the owner. 37 000 vaccinations were given by our staff in the period under review.

Tuberculosis:

Imports tested	230 cattle
Exports tested	7 113 cattle

Dairy herds tested during the year:

District	Herds	Total	I/Rs	Reactors	Passed
Mashonaland	37	3 565	15	1	3 549
Matabeleland	15	372	3	—	369
Manicaland	18	2 070	17	—	2 053
Midlands	54	4 994	47	1	4 946
Victoria	16	1 433	15	7	1 411
Sinoia	42	1 669	14	1	1 654
Gwanda	3	49	—	—	49
Chipinga	17	782	10	1	771
Total	202	14 934	121	11	14 802
1970–71	245	19 430	115	68	19 247

No lesions were found in any of the eleven animals classed as reactors. Compensation is assessed on a sliding scale rising from 30 per cent. to 60 per cent. and the owner receives any return on the carcass.

Ranch cattle: If at any time a tuberculous lesion is found in a carcass at an abattoir, all cattle on the farm of origin are tested to detect any remaining foci. In this respect 1 717 head were tested on five farms revealing two additional cases.

The annual tuberculin test of cattle on Liebig's Ranch was again carried out, revealing 79 reactors and 154 doubtful reactors in the 33 075 head tested. Lesions were found in only two of the 79 reactors when examined by Meat Inspectors at the abattoir. On retest the 154 doubtful animals passed the test. It is policy to have all reactors slaughtered and the carcasses examined but no compensation is payable on beef animals. It might be thought that this action is somewhat drastic, but only in this way can residual infection be eliminated from such a large property. Results at Liebig's over the last few years tend to support this policy:

Year	No. tested	Reactors	Positive on P.M.	Remarks
1968–69	30 417	123	78	19 generalized infection
1969–70	29 826	101	27	3 generalized infection
1970–71	32 319	237	25	No generalized infection
1971–72	33 075	79	2	No generalized infection

Meat inspection incidence

	Generalized	Localized	Total head
Salisbury	1	1	2
Bulawayo	5	10	15
Fort Victoria	1	—	1
Gatooma	1	—	1
Umtali	Nil	—	—
West Nicholson	Nil	—	—
Total	8	11	19
1970–71	20	39	59

If known tuberculous reactors are excluded the incidence of tuberculosis found in routine meat inspection is one in every 53 000 cattle slaughtered.

Johne's Disease: Not suspected or confirmed, the last case diagnosed was in an imported animal in 1969.

Brucellosis: The incidence varies between one and five per cent. in different districts. In all, 202 765 doses of strain 19 vaccine were sold to farmers and, of the 4 269 serum samples tested, 291 were positive.

Vibriosis: The significance of this condition as a factor in our comparatively low calving percentage has not been determined.

Bacillary White Diarrhoea: Not confirmed for many years but a valid certificate of freedom from this disease is necessary before any hatchery can sell fowls or chicks for breeding purposes. Routine tests were carried out on 111 046 birds with negative results.

Fowl Typhoid: Sporadic cases occur, mostly in African-owned poultry.

Fowl Cholera: Confirmed in African-owned poultry at 15 centres. Infected and contact birds are slaughtered and compensation paid to the owners.

Theileriosis: In Rhodesia this condition is due to Theileria lawrencei infection and not to Th. parva. Efforts to reduce the incidence of theileriosis, which is exclusively confined to European-owned properties, are being reasonably successful and mortality dropped from 232 head in 1971 to 151 head in 1972, 34 farms being affected.

Trypanosomiasis: During the period under review the total number of cattle exposed to some degree of risk, and therefore requiring regular inspection, was 495 905, an increase of only 2 069 head from the previous year. Protection of these cattle has involved the taking and examination of 178 300 blood films, a reduction of 8 286 (4,4 per cent.) on the previous year's figure. Parasites were detected in 5 698 (3,2 per cent.) of these blood films, the breakdown into species being as follows:

Trypanosoma congolense	4 497
T. vivax	1 098
T. brucei	Nil
Mixed infection	103

Treatments involving administration of Ethidium, Berenil and Isometamidium amounted to 104 471 (or for the individual drugs 1 522, 41 083 and 61 866), a decrease of 11 per cent. from last year.

Difficulties were experienced with the prophylactic regimes at centres in the Binga and Gokwe districts and an examination of isolates from the field in the Binga district established the presence of isometamidium-resistant strains of T. congolense. Investigations are being conducted into this problem.

In addition, 11 864 donkeys were inspected regularly and of the 632 blood films taken from these animals 44 showed T. congolense infections and three others showed T. brucei infections. Treatments administered to these donkeys amounted to 14 410 (3 116 of Berenil and 11 294 of isometamidium). Two T. brucei infections were also recorded in horses. All this work involved exacting patience, effort and skill on the part of the staff involved.

In the Wankie district trypanosomiasis infection in the Victoria Falls region appears to have dwindled away quite naturally to nothing, only one case being recorded during the year, namely on France Farm in October, 1971.

Other than the difficulties experienced with the isometamidium prophylactic regimes already referred to, the position in Binga district showed very little change from that of the previous year. Two cases were recorded at Lubimbi dip in the south, the highest total since 1967, but these were considered to be related to the increased challenge in the Mzola region, to the east.

In the Lupane district increased challenge was recorded in the Mzola region. This development was viewed with considerable concern and, in order to deal with it, the Sebungwe operations area spraying plan had to be modified considerably at the expense of another important area.

The problem in Gokwe is still one of major proportions but considerable improvements were recorded during the year. The total number of cases fell from 1 993 to 1 094 and it is particularly noteworthy that only 103 cases were recorded in the Copper Queen African Purchase Land compared with 750 cases in the previous year.

Although there was a reduction in the number of cases occurring in the Urungwe district, from 643 to 421, the problem still remains delicate with much consolidation work, from the point of view of controlling the vector, still to be done.

In the Darwin district the position deteriorated with considerable fly pressure from across the border, particularly into Chimanda T.T.L. and as far south as Mkota T.T.L.

In the Chipinga and Chiredzi districts persistent foci at Chibuwe and on the Turgwe River were successfully eliminated. Attention has now shifted to the cattle centres at Mwangezi, Muumbe, Zamchiya and Chinyamatika right on the Chipinga border. Here, because of climatic considerations, the vector is G. pallidipes and not the more prevalent lowveld species G. morsitans.

Tsetse Control

In 1972 the application in the dry season of residual insecticides to the resting and refuge sites of tsetse flies proceeded with minimal problems from the beginning of June to the end of September. In the case of the Chipinga front, however, spraying continued until the end of October. Once again the operations were notable for the very few hold-ups caused by breakdown of transport, due to the unfailing service provided by the Central Mechanical Equipment Department. In all 51 Rhodesian and three Portuguese spraying teams were mounted, which represents an increase of nine Rhodesian teams over the previous year. A total of 249 790 kg of 75 per cent. DDT wettable powder was dispensed over 11 250 km² of tsetse habitat in Rhodesia and Moçambique by means of pneumatic sprayers. The application rate varied according to the particular situation, but on the country-wide basis, an average rate was 16,65 kg of active ingredient per km². Conventional spraying was applied to 10 877 km² at an average rate of 325 litres of 5 per cent. DDT wettable powder suspension per km², and 373 km² were treated by parallel line pattern spraying at an average rate of 556 litres per km².

Eight teams were used in the Sebungwe operations area, an increase of three on the previous year. Regrettably, because of the upsurge of cattle trypanosomiasis on the Mzola drainage, it was found necessary to fragment the spraying effort in this area to a much greater degree than had been intended. The Sengwa Research area, which had been considered a weak link in our defences was treated in its entirety. In Sebungwe 1 921 km² were sprayed.

Once again the largest spraying operation was conducted in the Gokwe/Sanyati area, 15 teams being deployed. Conventional spraying was applied to 3 283 km² and parallel line pattern spraying to 81 km².

In the Urungwe/Kariba area the number of teams was increased from six to 12 to reclaim the lakeshore region from tsetse flies. An extensive access system of 254 km of bulldozed track was developed in the lakeshore-Charara drainage region to facilitate the operation. The spraying extended in the easterly direction to as far as the Mvuramechi River to cover the infested area lying to the south of the Naodza-Angwa game fence. Conventional spraying was applied to 2 067 km². Early reports indicate a massive decline in the tsetse population.

Four teams were employed in the Sipolilo area and spraying was carried out on the Rukute-Angwa drainage to the north of the Doma farming region, in Kachuta Tribal Trust Land and the Kadzi Tribal Trust Land insecticide was applied to 637 km².

A total of eight teams was again deployed in the Darwin-Mtoko-Inyanga area and the routine application of insecticide to habitat on the Gairezi drainage in Inyanga Tribal Trust Land was also carried out. The spraying in the Chimanda Tribal

Trust Land region was extended in a westerly direction in an attempt to arrest the spread of tsetse from the east into Chiswiti Tribal Trust Land. In this area as a whole conventional spraying was applied to 1 922 km².

Commencement of spraying in the Chipinga sector was regrettably delayed until the beginning of August because of other commitments. In view of this delay the operation was seriously hampered by rain in October. Insecticide was applied to 390 km².

Further spraying was carried out in Moçambique to consolidate the position won in previous years. Four Rhodesian teams commenced work at the beginning of June and were joined by three Portuguese teams and personnel from the Republic of South Africa, on the 1st July. The operation was terminated on 29th September. Conventional spraying was applied to 757 km², and parallel line pattern spraying to 292 km². Early reports indicate that the tsetse population has been seriously affected.

Game and cattle fences have continued to play a major role in control operations on all fronts and 1 261 km of game fence and 1 091 km of cattle fence were maintained.

In the Urungwe area a good start was made on reconstructing the Naodza-Angwa game fence on an all-steel basis. The total length of fence reconstructed was 105 km at a cost of $861 per km. Also, in order to facilitate ease of access through the broken escarpment country which the fence traverses, the access track servicing the fence is being realigned by bulldozer at a gradient at no time greater than 1 : 10. The total length of access realigned to date has been 90 km at a cost of $318 per km.

In view of the considerable improvement in the Sabi-Lundi region — no tsetse flies have been caught or seen within 80 km of the Rhodesia/Moçambique border south of the Rio Save—it was decided to realign the main defence along the international border. This will permit fuller utilization of the Gona-re-Zhou game reserve by the Department of National Parks and Wild Life Management. The new defence line will take the form of a fenced corridor 3,5 km wide, to be called the Border Barrier, and will run from the Lundi River to the Lourenço Marques railway line, using the existing foot-and-mouth border game fence as one side of the corridor. A start has been made on this work with the removal of the Chefu game fence and the bulldozing of the first 19 km of the new inner line and access track. The Border Barrier will be linked with the existing defences in the Chipinga district.

Adequate access roads are essential for the efficient prosecution of anti-tsetse control measures. Some 640 km of track were constructed and 10 425 km of existing roads and tracks were maintained during the year.

NON-SPECIFIED DISEASES

Quarter Evil: Confirmed deaths 361 head, reported cases 2 473. Most of the reported cases were from the African sector where, as already indicated, there is gross overstocking. In view of the African's resistance to selling his surplus stock for his own benefit one reluctantly wonders whether it is worth preventing losses from quarter evil if the animal's destiny is to die of poverty.

Enterotoxaemia: Sporadic cases reported in sheep flocks where vaccination has been neglected.

Tetanus: Sporadic deaths occur in sheep where rubber rings have been misused for castration.

Tick-borne Diseases:

	Deaths 1972	*Deaths 1971*
Theileriosis	151	232
Redwater	72	203
Gallsickness	235	278
Heartwater	187	158

Bluetongue: Occurs in exotic sheep where vaccination was omitted—48 cases were recorded.

African Horsesickness: In Rhodesia most horses are vaccinated annually but sporadic cases occur in spite of this measure, 27 deaths and 10 recoveries were reported.

Mineral and Chemical Poisons: Seven hundred and sixty-nine deaths of which 445 were due to arsenic and 108 caused by excess urea.

Plant Poisonings: Seven hundred and eighty-two deaths of which 240 were attributed to Dichapetalum cymosum (Umkauzaan), 177 to species of Albizzia and 108 to Urgineas (tulps).

Blood Smears Examined by the Field Service:

Trypanosomiasis	5 698
Anaplasmosis	257
Redwater	120
Theileriosis	72
Quarter Evil	55
Heartwater	11
Negative	172 829
	179 042
1970/71	182 737

Post-Mortem Examinations

District	*Bovine*	*Ovine*	*Porcine*	*Poultry*	*Miscellaneous*	*Total*
Mashonaland	348	277	64	53	36	778
Matabeleland	164	162	99	3 881	50	4 356
Manicaland	214	129	18	69	12	442
Midlands	204	120	14	69	17	424
Victoria	69	62	16	43	4	194
Sinoia	132	98	5	117	6	358
Gwanda	16	9	10	12	5	52
Chipinga	71	13	2	35	2	123
Total	1 218	870	228	4 279	132	6 727
1970–71	1 315	712	206	3 298	525	6 056

VETERINARY RESEARCH BRANCH

Diagnostic and advisory services continued at a high level as indicated by the following summary:

Post-mortem examinations	1971–72	1970–71
Poultry	4 074	2 900
Cattle	18	23
Sheep	39	66
Pigs	22	72
Chinchillas	34	54
Rabbits	171	163
Bovine foetuses	174	208
Ovine foetuses	32	5
Other specimens		
Brains for rabies	499	588
Blood samples for brucellosis	2 777	9 243
Tampons for vibriosis	1 748	3 338
Milk samples for mastitis	1 045	1 345
Faeces	1 645	964
Meat hygiene specimens	3 973	1 732
Miscellaneous	8 044	8 996
Total	24 295	29 697

Vaccine Sales	1971–72 *Doses*	1970–71 *Doses*
Rift Valley Fever/Wesselsbron	89 410	230 610
Pasteurella	11 020	38 700
Gallsickness	14 301	15 343
Red Water/Gallsickness	17 645	20 159
C.A. (Strain 19)	178 785	202 765
Horsesickness	8 527	7 835
Anthrax	46 000	43 500
Bluetongue	55 250	68 550
Calf Paratyphoid	6 984	7 362
Lamsiekte (Botulism)	69 150	52 050
Fowl Pox	446 700	489 300
Fowl Typhoid	49 800	24 100
Enterotoxaemia	46 650	80 900
Rev. I	1 150	1 900
Lumpy Skin	81 486	300
Tetanus	600	2 200
Newcastle Disease (Inactivated)	2 516 910	594 670
La Sota	2 728 000	—
Komarov	1 897 600	—
Hitchner	213 000	—
Heartwater	42	12
Nodular Worm Remedy	2 000	1 200
Lamb Dysentery	—	900
Total	8 481 010	1 882 356

RESEARCH

Research into the possible role of buffalo as reservoir hosts of foot and mouth disease continued. The most significant finding was the apparent ability of buffalo to "transfer" the oesophageal carrier state, presumably from mother to calf, without the initiation of active disease in either the calf or susceptible cattle which were in close contact at the time of this "transference".

Observations also continued into the effects of Schistosomiasis (Bilharzia) on cattle. It appears that the bovine has a very effective protective mechanism which limits the pathogenic effects of the parasite by suppressing egg laying to a very low level from about 20 weeks after infestation. There is also a progressive elimination of parasites from the body. As a result the clinical effects of infestation are confined to the short period of peak egg laying after the primary infestation, and are approximately proportional to the weight of infestation. Thereafter the animal harbours the parasite and passes eggs in the faeces at a low level but is clinically unaffected.

RESEARCH BY THE TSETSE AND TRYPANOSOMIASIS CONTROL BRANCH

Trypanosomiasis research

Research during the year has centred on trypanosomiasis in game animals, sheep and dogs, the testing of drug resistant strains of Trypanosoma congolense and trials with insecticides and a new insect repellent.

The effects of trypanosomiasis on sheep were investigated. The results of the ecological studies show that sheep, when forming part of a heterogeneous population of domestic and wild animals, are not fed upon by tsetse flies to the same extent as other Bovidae. Both natural and artificial infections produce haematological changes with development of a progressive macrocytic, normochromic anaemia. Death is frequently complicated by concomitant diseases, of which bacterial pneumonia is the most commonly encountered condition.

Research into the trypanosomiasis of game animals has been studied both in the laboratory and in the field. A kudu *(Tragelaphas strepsiceros)*, was infected with a strain of *T. rhodesiense*. The parasites were harboured by the kudu for 472 days and during most of this period were only detectable by xenodiasgnosis in mice. The kudu suffered no detectable pathological effects during the period of investigation. Due to the animal becoming intractable it was cured on day 472 after infection and the experiment terminated.

The investigation of drug tolerant strains of trypanosomes obtained from cattle protected with prophylactic drugs is always one of the most important aspects of our research effort. Isolates of T. congolense recovered from cattle in the Manjolo Tribal Trust Land were shown to be resistant to isometamidium at the dosage rate of 1 mg/kg.

Identification of the exact species of animal on which a tsetse fly has fed can be determined by analysis of the residual blood in the fly's gut, and continues to provide information necessary to the monitoring of selective game elimination. Improvements in these techniques now give a very high degree of specificity, which would enable us to detect any change to an alternative host as a source of food.

Tsetse research

Comparison of baits

A large pen of electrified netting was used to electrocute tsetse flying towards animals placed inside. Most flies were caught with an ox but large catches were obtained with a donkey, goat, sheep, warthog, bushpig, bushbuck, kudu, impala and buffalo calf. It is remarkable that the impala, an infrequent host of the tsetse fly, attracted such large numbers.

Hand-net catches of flies engorging on animals were generally greater when the baits were mobile than when stationary. An ox consistently afforded the greatest catches, followed by a donkey and kudu. Few flies were taken from a warthog, bushpig and bushbuck.

Catches made by electric nets from a variety of mobile models of hosts indicated that large size and dark coloration were associated with greatest catches.

Odours

The importance of odours in attracting tsetse to stationary baits was investigated. Animals were placed in roofed pits and air from the pits was blown out at ground level near an electric net which trapped attracted flies. Ox odour was most effective but large catches were obtained with a donkey, goat, sheep, bushbuck, bushpig and buffalo calf. Human odour was ineffective and greatly reduced catches when combined with ox odour.

An experiment to compare catches when using only a visual target, or a visual target with odour (from ox and from men), or odour alone, indicated that both visual and olfactory stimuli can attract tsetse to stationary baits, but that most flies are caught when both stimuli are offered.

Various other studies on the influence of odours, movement and colour of baits and the nutritional state of flies were conducted. In this respect we gratefully acknowledge the generous grants made to the Department by the Rhodesian Cattle Producers' Association, which enabled these and other projects to proceed.

MEAT INSPECTION

The detailed report of the Chief Veterinary Public Health Officer is issued as a separate report.

A phenomenal increase in cattle slaughtering has been recorded (23,9 per cent.). The natural tendency to rejoice must be tempered by the fact that most of the increase was accounted for by female stock, much of it pregnant. The grim disproportionate sources of slaughter cattle show that nearly 90 per cent. of Rhodesian commercial beef is derived from 50 per cent. of the national herd.

Breakdown of cattle figures

	Bulls	*Cows*	*Oxen*	*Calves*
1971–72	1,33%	44,20%	52,48%	1,99%
1970–71	1,6%	35,7%	60,7%	1,8%

Total condemnations of carcases

Centre	*Cattle*	*Sheep*	*Goats*	*Pigs*
Salisbury	0,45	0,65	2,89	0,62
Bulawayo	0,34	0,45	1,23	2,10
Fort Victoria	0,47	0,06	—	0,62
Gatooma	0,53	—	—	—
Umtali	0,55	0,46	3,77	0,20
West Nicholson	Nil	—	0,01	3,45
Total	0,44	0,54	0,51	0,90
1970–71	0,51	0,34	0,34	0,99

Cysticercus bovis

(beef measles)

Centre	*Condemned*	*Detained*	*Incidence*	1970–71
	%	%	%	%
Salisbury	0,054	1,71	1,76	1,56
Bulawayo	0,103	1,10	1,21	1,62
Fort Victoria	0,06	0,71	0,77	0,71
Gatooma	0,20	2,51	2,71	2,39
Umtali	0,035	0,89	0,93	0,94
	0,097	1,52	1,62	1,52

The upward trend continues as predicted, with a new high of 1,62 per cent. infected animals, and a very disturbing incidence of 2,71 per cent. at Gatooma. When the Gatooma kill is dissected into areas of origin, the incidence of measles in Midlands cattle is over three per cent., showing that this section of Rhodesia has twice the problem of the rest of the country. The Veterinary Public Health Officer, Gatooma, Dr. Chambers, has collected a considerable amount of statistical evidence with regard to possible human sources of tapeworm eggs, and has found a close correlation between the concentration of small mine workings and the incidence of beef measles in different areas in Rhodesia. This may well be significant, and his data would be invaluable as a starting point for any attempt to find and treat cases of T. saginata in the human population.

Whether or not this method of control would be worthwhile can be assessed in the light of the cost of this condition to beef producers. In the expected continuance of upward trends in total slaughterings and also measles incidence, a total of 10 000 or more cases can be expected in the coming year; with the compensation rate now paid by the Cold Storage Commission, the loss to the producer will be approximately $30 per head, making a total cost of $300 000.

Hydatidosis

Centre	Lungs %	Liver %	Incidence %	1970–71 %
Salisbury	0,32	0,04	0,36	0,22
Bulawayo	1,94	0,018	1,95	1,70
Victoria	0,622	0,044	0,67	0,69
Gatooma	0,273	0,041	0,31	0,25
Umtali	0,827	0,091	0,92	0,91
West Nicholson	—	—	—	2,17
				0,77
Total	0,802	0,037	0,84	0,77

Fasciola gigantica
(liver fluke)

Centre	Condemned %	Trimmed %	Incidence %	1970–71 %
Salisbury	25,50	21,91	47,41	52,84
Bulawayo	15,40	3,10	18,50	20,53
Victoria	20,87	3,21	24,08	12,35
Gatooma	41,06	4,05	45,11	40,48
Umtali	26,73	5,46	32,20	29,00
Total	24,86	9,48	34,36	33,10

The slightly lower incidence of fluke in both Salisbury and Bulawayo is heartening, although the over-all incidence shows a further increase.

The total weight of liver lost through fluke alone is now over 600 tonnes, worth conservatively a quarter of a million dollars.

Trauma condemnations

Centre	Carcases	F/Q/legs	H/Q/legs	Tails	Other wt kg
Salisbury	39	33/101	28/45	61	15 722
Bulawayo	7	75/118	2/5	137	1 278,5
Fort Victoria	7	46	14	420	24
Gatooma	15	2/86	1/2	103	300,5
Umtali	5	4/	4/	31	371
West Nicholson	Nil				
Total	73	465	91	752	17 696
1970–71	78	351	87	779	23 940

The over-all picture is one of improvement, and in most serious cases the causes of injury have been preventable; horned, weak or overloaded animals are usually involved.

Tuberculosis—Meat Inspection Incidence —see page 69.

Sheep and goats
Stilesia hepatica

	Liver condemned (sheep and goats)	%	Bovine livers condemned	%
Salisbury	22 771	90,46	388	0,22
Bulawayo	8 241	89,42	925	0,65
Fort Victoria	2 169	67,13	343	0,38
Gatooma	Nil	—	336	0,30
Umtali	4 168	74,79	117	0,82
West Nicholson	6 393	89,04	—	—
Total	43 742	86,84	2 109	0,40
1970–71	69 994	90,4	1 574	0,37

The over-all incidence of condemnations is lower, probably due to an increase in trimming of affected livers in sheep. Bovine incidence is up slightly.

Pigs
C. cellulosae
(pork measles)

Centre	Condemned %	Detained %	Total %	Incidence %	1970–71 %
Salisbury	56	Nil	56	0,06	0,12
Bulawayo	437	Nil	437	1,76	2,13
Fort Victoria	33	Nil	33	0,33	0,28
Gatooma	Nil				
Umtali	5	Nil	5	0,17	0,03
West Nicholson	11	1	12	3 18	3,67
Total	542	1	543	0,41	0,58
1970–71	866	40	906	0,41	0,58

The total of 543 cases represented 25 from European owners and 518 from African owners.

Ownership proportions

	European % of total	African % of total
Salisbury	93,5	6,5
Bulawayo	57,1	42,9
Fort Victoria	74,9	25,1
Gatooma	—	—
Umtali	64,3	35,7
West Nicholson	0	100,0
Total	84,3	15,7
1970–71	80,9	19,1

Animals dead on arrival

	Cattle	Pigs	Sheep and goats
Salisbury	12	68	4
Bulawayo	16	6	2
Fort Victoria	3	—	—
Gatooma	10	—	—
Umtali	3	6	—
West Nicholson	—	—	—
Total	44	80	6
1970–71	28	80	6

A slight increase was seen in the number of cattle, and the proportion of pigs.

The vast majority of deaths were of traumatic or stress origin, the latter being predominant in pigs. A few cases of infectious conditions were encountered, none of them notifiable.

MEAT HYGIENE LABORATORIES

The laboratories at Bulawayo and Gatooma have had an exceptionally busy year, with the Salisbury centre again enjoying the facilities of the Veterinary Research Laboratory for culture purposes.

Compulsory and routine swabbing of export products has demanded a great deal of attention, and has served the dual purposes of ensuring that these items can be certified as free from Salmonella organisms, and also acting as a general monitor of meat hygiene standards in the export factories.

Various other activities have continued as before, often necessarily in a lower key.

Swab cultures for Salmonella—Export meats

(a) *Bulawayo* (includes Fort Victoria samples)

Swabs from meat, 17386—50 positive	0,7%
Rectal swabs from meat handlers, 489—5 positive	1%
Swabs from abattoir and viscera, 839—27 positive	3,2%

(b) *Gatooma*

Swabs from meat, 6 024	0,17%
Rectal swabs from meat handlers, 553	0,73%
Swabs from abattoir and viscera, 1 784	1,7%

(c) *Salisbury*

Swabs from meat, 11 045	0,86%
Rectal swabs from meat handlers, 1 103	0,27%
Swabs from abattoirs and viscera, 478	Nil

Numerous other procedures including jaundice tests, bone marrow tests, smears, bacteriological examinations, pH tests and surveys were carried out at all laboratories to maintain and improve standards.

CENSUS OF STOCK

Census figures are given in the Appendix.

Acknowledgements

The assistance and co-operation of many other organizations and sectors of Government are gratefully acknowledged, particularly the Rhodesia National Farmers' Union, Cold Storage Commission, the Ministry of Internal Affairs and the Ministry of Lands and Natural Resources.

Sincere thanks and appreciation are also due to my own staff for their conscientious devotion to duty.

J. M. WILLIAMSON,
Director of Veterinary Services.

APPENDIX

Census of cattle, 1971-72

District	European-owned cattle	African-owned cattle	Total cattle
Mashonaland	814 201	582 705	1 396 906
Matabeleland	465 247	517 599	982 846
Midlands	375 003	472 617	847 620
Manicaland	186 229	397 295	583 524
Victoria	375 952	557 793	933 745
Gwanda	107 526	188 689	296 215
Sinoia	298 266	92 773	391 039
Chipinga	61 531	80 116	141 647
Total	2 683 955	2 889 587	5 573 542
1970–71	2 708 997	2 843 977	5 552 974
Difference	+25 042	+45 610	−20 568

Small stock census

	Pigs			Sheep			Goats			Equines		
	European owned	African owned	Total	European owned	African owned	Total	European owned	African owned	Total	European owned	African owned	Total
Mashonaland	50 867	27 456	78 323	101 582	27 463	129 045	9 174	91 659	100 833	3 514	6 288	9 802
Matabeleland	9 248	24 515	33 763	41 274	131 462	172 736	7 597	590 512	598 109	2 378	46 205	48 583
Manicaland	6 208	5 778	11 986	24 501	68 722	93 223	1 710	166 266	167 976	618	3 272	3 890
Midlands	4 186	11 128	15 314	33 750	63 023	96 773	4 527	265 974	270 501	1 212	42 290	43 502
Victoria	3 787	23 016	16 803	23 699	99 439	123 138	4 747	220 307	225 054	821	19 467	20 288
Sinoia	6 726	7 269	13 995	36 016	13 029	49 045	3 587	31 565	35 152	775	4 157	4 932
Gwanda	1 380	4 362	5 472	4 966	50 727	55 693	2 237	184 015	186 252	151	184 492	184 643
Chipinga	521	1 714	2 235	6 918	7 517	14 435	194	51 323	51 517	306	4 010	4 316
Totals	82 923	105 238	178 161	172 706	461 382	734 088	33 773	1 601 621	1 635 394	9 775	310 181	319 956
1970–71	83 870	118 804	202 674	327 013	497 651	824 664	35 027	1 669 971	1 704 998	9 425	135 336	144 761
Difference	−947	−13 566	−24 513	−54 307	−36 269	−90 576	−1 254	−68 350	−69 604	+350	+174 845	+175 195